The New Zealand
Journal of Agriculture.

VOL. XXXIII. WELLINGTON, 20th NOVEMBER, 1926. No. 5.

DAIRY-HERD TESTING IN NEW ZEALAND.

REVIEW OF 1925–26 SEASON

(Concluded.)

W. M. SINGLETON, Director of the Dairy Division, and W. N. PATON.

ANALYSIS OF INDIVIDUAL RECORDS.

IN the 1925–26 season for the first time analyses of production records for all cows included in the summaries were requested, and in practically all instances satisfactory returns have been obtained. These analyses supply a better idea of the production for all tested cows than do arithmetical averages. An arithmetical average does not tell us how many cows are profitable or unprofitable, and this information is of considerable importance in considering the position of dairying. It is possible for culling to be done from one season to another and yet not show any effect in the arithmetical average. By chance, slight reduction in the proportion of higher-producing cows may leave the average practically the same as it was previously. An analysis of individual records, however, may reveal the position quite clearly. If these analyses are collected year by year much useful information will be obtained on improvement in average production of dairy cows through herd-testing.

Table 10 supplies the results obtained from the effective analyses returns received for the season's testing, and have been classified according to land districts, &c. All those records for cows in milk 100 days or over, and included in annual summaries, have been utilized in this table. Instead of quoting the actual number of records for the various classes these have been reduced to percentages to facilitate comparison. The total numbers of cows to which the percentages refer are given on the extreme right of the table. Where numbers of records are so low that the resulting percentages are less than 0·01, and therefore insignificant, asterisks have been inserted. The limits of classes as given in this table may not be quite clear to readers, and by way of explanation these may be amplified as follows: Under 50 lb.; 50 lb. and under 100 lb.; 100 lb. and under 150 lb.; and so on. They have been given in the abbreviated form only because of lack of space.

Table 10.—Percentage Distribution of Records for all Tested Cows represented in Effective Annual Summaries received, classified according to Land Districts, &c., Season 1925–26. (Basis: In Milk 100 Days or over.)

Land District, &c.	Class Limits (in Pounds of Butterfat).																	Total Number of Cows classified.
	Under 50.	50–100.	100–150.	150–200.	200–250.	250–300.	300–350.	350–400.	400–450.	450–500.	500–550.	550–600.	600–650.	650–700.	700–750.	750–800.	800–850.	
North Auckland ..	0·54	5·73	17·46	24·58	22·98	15·90	8·44	3·14	0·91	0·23	0·09	0·01	..	..	..	..	..	20,925
Auckland	0·17	3·44	12·17	22·70	25·92	19·28	10·39	4·20	1·27	0·36	0·07	0·02	0·01	*	*	..	..	72,611
Gisborne	0·24	6·83	22·60	27·26	23·72	12·71	4·39	1·69	0·45	0·12	..	..	..	..	..	..	..	3,368
Hawke's Bay ..	0·33	8·27	22·71	27·29	21·77	12·11	4·98	1·68	0·70	0·16	..	..	..	..	..	..	..	4,294
Taranaki	0·03	1·49	8·35	19·76	26·34	23·53	12·89	5·29	1·70	0·47	0·11	0·02	0·02	..	..	..	..	12,846
Wellington.. ..	0·43	4·57	15·02	24·21	26·25	16·89	8·47	2·91	0·99	0·21	0·04	0·01	*	..	..	..	..	21,905
North Island ..	0·26	4·03	13·67	23·21	25·38	18·38	9·70	3·79	1·17	0·31	0·07	0·01	0·01	*	*	..	..	135,949
Nelson	..	4·11	11·91	27·10	26·90	16·22	9·24	3·08	1·03	0·41	..	..	..	..	..	..	..	487
Canterbury ..	..	2·05	17·39	24·55	25·32	17·90	8·70	2·56	0·77	0·77	..	..	..	..	..	..	..	391
Otago	..	3·11	17·16	22·64	24·75	15·42	8·96	4·23	1·74	0·87	0·75	0·25	..	..	..	..	0·12	804
Southland	0·67	3·60	14·14	28·28	28·66	15·59	6·52	1·88	0·44	0·14	0·04	..	..	0·01	..	0·01	..	8,017
South Island ..	0·56	3·53	14·41	27·60	28·12	15·70	6·95	2·17	0·59	0·24	0·09	0·02	..	0·01	..	0·01	0·01	9,699
Dominion ..	0·28	3·99	13·72	23·51	25·56	18·21	9·51	3·68	1·13	0·31	0·07	0·01	0·01	*	*	*	*	145,648

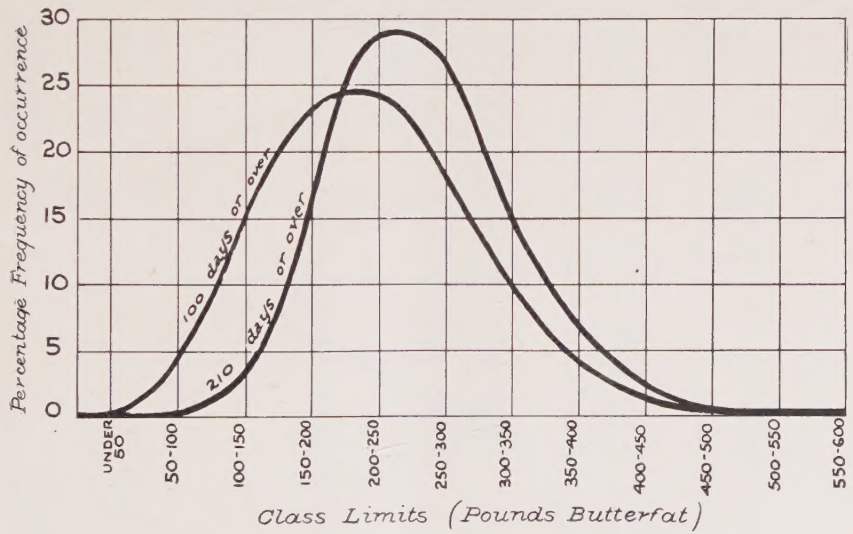
* Data occurring, but relatively insignificant.

This table may be conveniently studied in conjunction with Table 8, to which it should prove a useful supplement. The total number of cows for the various land districts are the same for both tables, with the exception of Auckland, Wellington, and Nelson. In these cases one return for each has been omitted, owing to the analyses of records not being in order or not supplied. The differences in numbers for Auckland and Wellington are so relatively small that they do not detract from the value of comparison of the two tables. The results for Nelson, Canterbury, and Otago are so sparse that no great importance can be attached to these cases, and have been included only for interest and to complete the table.

In order to illustrate the difference in distribution of records for results from the two systems of testing Table 11 has been compiled. In the upper half of the table numbers of records are given, while in the lower half these have been converted to percentages, as in the case of Table 10. This table may be conveniently studied in conjunction with Table 6, together with the remarks relating thereto.

Similarly, Table 12 and Graph 2 are supplied to supplement Table 7 and the comment thereon. Graph 2 presents the data shown in Table 12, with the exception that the curves have been "smoothed" slightly. This graph may serve to show how results would appear if stringent culling had been effected, for, virtually, when from the same data summaries are compiled on the two bases—100 days or over and 210 days or over—culling has been done, only it is with records instead of cows.

Table 12 also shows distribution of herd averages compiled on the two bases for all associations for which testing was done by the Dairy Division's officers.



GRAPH 2. COMPARISON OF THE PERCENTAGE FREQUENCY DISTRIBUTION OF RECORDS ACCORDING TO THE TWO BASES—ALL COWS IN MILK 100 DAYS AND 210 DAYS OR OVER RESPECTIVELY. (DATA RESULTING FROM ALL ASSOCIATIONS CONTROLLED BY DAIRY DIVISION.)

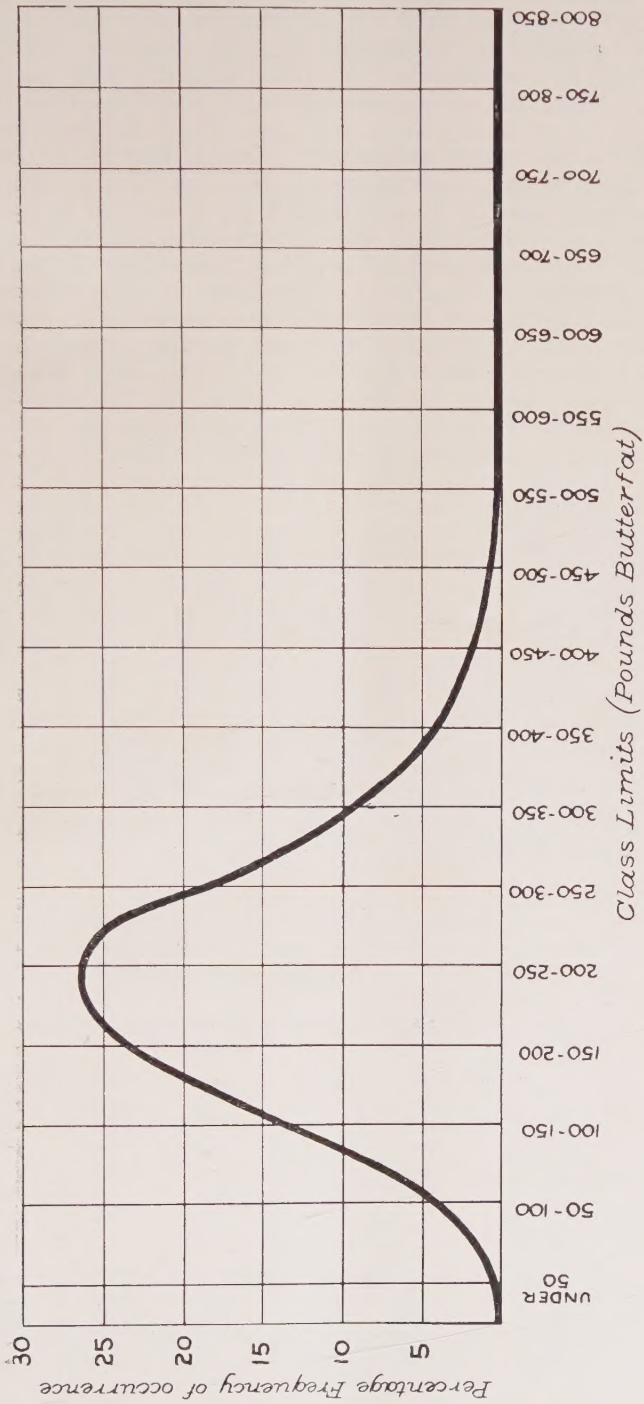
Table 11.—Distribution of Records for all Tested Cows in the Dominion represented in Effective Annual Summaries received, Season 1925–26.
(Basis: In Milk 100 Days or over.)

System.	Class Limits (in Pounds of Butterfat).																Total Number of Cows classified.
	Under 50.	50–100.	100–150.	150–200.	200–250.	250–300.	300–350.	350–400.	400–450.	450–500.	500–550.	550–600.	600–650.	650–700.	700–750.	750–800.	800–850.	
Numbers.																		
Association ..	122	2,207	7,853	11,351	11,488	8,211	4,293	1,745	582	163	46	9	2	..	..	..	1	48,073
Group ..	285	3,610	12,133	22,886	25,738	18,306	9,565	3,620	1,067	282	55	11	11	4	1	1	..	97,575
Both ..	407	5,817	19,986	34,237	37,226	26,517	13,858	5,365	1,649	445	101	20	13	4	1	1	1	145,648
Percentages.																		
Association ..	0·25	4·59	16·34	23·61	23·90	17·08	8·93	3·63	1·21	0·34	0·10	0·02	*	..	..	..	*	48,073
Group	0·29	3·70	12·43	23·45	26·38	18·76	9·80	3·71	1·09	0·29	0·06	0·01	0·01	*	*	*	..	97,575
Both ..	0·28	3·99	13·72	23·51	25·56	18·21	9·51	3·68	1·13	0·31	0·07	0·01	0·01	*	*	*	*	145,648

* Data occurring, but relatively insignificant.

Table 12.—Percentage Distribution of Records and Herd Averages for all Associations controlled by Dairy Division, Season 1925–26.

Basis.	Class Limits (in Pounds of Butterfat).											Total Number classified.
	Under 50.	50–100.	100–150.	150–200.	200–250.	250–300.	300–350.	350–400.	400–450.	450–500.	500–550.	550–600.	
Records.												Cows.
100 days or over	0·10	4·11	14·91	22·57	24·11	18·25	9·86	4·27	1·45	0·28	0·07	0·01	16,173
210 days or over	..	0·06	3·13	16·19	28·74	26·46	15·46	6·96	2·38	0·47	0·12	0·01	9,745
Herd Averages.													Herds.
100 days or over	..	4·17	15·59	24·87	25·54	20·30	6·59	2·55	0·27	0·13	..	..	744
210 days or over	..	..	2·05	12·50	34·14	32·84	13·25	4·66	0·37	0·19	..	..	536



GRAPH 3. PERCENTAGE FREQUENCY DISTRIBUTION OF RECORDS FOR ALL TESTED COWS REPRESENTED IN EFFECTIVE ANNUAL SUMMARIES RECEIVED. (BASIS: IN MILK 100 DAYS OR OVER.)

Graph 3 shows the frequency distribution curve compiled from the percentages quoted in Tables 10 and 11 for all tested cows in the Dominion included in satisfactory analyses received. By close inspection it will be observed that this curve does not slope similarly on both sides of the apex, or, in other words, it is not absolutely symmetrical. Apart from other points, it is more drawn out on the right-hand side of the base than on the left. This is due to the better response to feeding and care of some cows over others, although among such a large number of cows the law of chance will so operate that there are likely to be infinite degrees of feeding, quality of stock, conditions, &c., represented, and no one class proportionately more or less than its likelihood of occurrence. The peak of the curve corresponds to an average known in statistical phraseology as a "mode," and indicates a value which occurs with the greatest frequency. In other words, a perpendicular from this point to the base line gives a reading of approximately 222 lb. of butterfat, and this record, on investigation, should be found to occur more times than any other.

It is interesting to note that the arithmetical average for the same records included in this graph works out in round numbers as 221 lb. butterfat. Measuring from this 222 lb. point on the base line, we find that the distance to the left at which the curve more or less meets the base line is equivalent to about 200 lb. butterfat, while on the right-hand side it is about 300 lb. As mentioned, difference in production in response to feeding accounts for some of this effect, but also it is partly due to culling. Moreover, had we been able to obtain records for all cows to drying-off dates, and satisfactorily eliminated those cows previously mentioned which died, fell sick, were culled, or sold at periods during test considerably before their testing would have been completed, it should be found that the resulting frequency curve fell away more steeply on the left-hand side than on the right. This would then provide an effective measure for the extent to which poor-producing cows had been eliminated. It is hoped that at later dates, when more data are available, measures of this sort may be possible.

Table 13.—Analysis of Production of Cows in a Large Association for Past Five Seasons. (100-day Basis.)

Class, &c.	Percentage of Total Cows.				
	1921-22.	1922-23.	1923-24.	1924-25.	1925-26.
Under 150 lb.	50·6	39·3	40·8	35·3	28·9
150–200 lb.	29·8	34·3	32·8	31·5	23·7
200–250 lb.	13·8	18·7	18·1	21·0	28·4
250–300 lb.	4·1	6·1	6·6	8·6	11·7
300–350 lb.	1·4	1·4	1·4	2·3	3·7
350–400 lb.	0·3	0·2	0·2	1·0	2·0
400–450 lb.	..	..	..	0·3	1·2
450–500 lb.	..	..	..	..	0·2
500–550 lb.	..	..	..	..	0·2
Percentage under 200 lb. ..	80·4	73·6	73·6	66·8	52·6
Percentage 200 lb. or over ..	19·6	26·4	26·4	33·2	47·4
Average butterfat per cow ..	158·05	167·79	167·96	177·96	196·78
Average days in milk ..	201	214	219	215	213

An association for which analyses are available covering a period of five years, and during which time gradual improvement in average production has been effected, affords a good example of the use to which analyses of individual records of cows may be put. These particulars are supplied in Table 13.

AVERAGE PRODUCTION LIMITED BY SIZE OF HERD.

Table 14 has been compiled from the season's results for a large association, and is intended to give an indication on variation in average production with size of herd. Only those herds were included in the classification which showed 200 or more days as the average days in milk since calving. The figures used were compiled on the basis of cows in milk 100 days or over, for if the 210-day basis were used some cows would probably be eliminated and not give a correct index of the real size of the herds. As it is, some cows in a few herds may have been in milk less than 100 days, but there is not so much chance of this as in the case of the 210-day basis. It is unfortunate that no information was on hand in regard to which herds were hand- or machine-milked. We hope, however, to obtain data along this line in the near future.

This table shows a steady decrease in average production for increase in size of herd, but it would not be wise to take this case as being typical. It presents, however, a phase of dairying which should be given due consideration, and one which is full of interest. It will be noticed that at the 36–40 cows class a break is made in the sequence of the gradual decline of average production, and from this point onwards another stage of decrease occurs. At this point it might with some safety be assumed that extra labour was introduced, and that this would not be warranted in the immediately preceding cases. As previously mentioned, however, both hand and machine milking are represented, and no very definite conclusions could be made on the location of the extra-labour point until the data had been divided for this factor.

Table 14.—Average Production classified according to Number of Cows per Herd: Data from One Large Association, Season 1925–26. (Basis: 100 Days or more, including only those Herds 200 Days in Milk or over.)

Class Limits: Cows per Herd.	Number of Herds.	Number of Cows.	Average Days in Milk.	Average Butterfat per Cow.	Average Butterfat per Day per Cow.
				lb.	lb.
1–5 ..	8	35	269	315·42	1·17
6–10 ..	12	90	255	276·91	1·08
11–15 ..	16	206	251	257·98	1·03
16–20 ..	12	223	241	230·68	0·96
21–25 ..	10	235	247	229·62	0·93
26–30 ..	5	145	245	222·42	0·91
31–35 ..	4	128	249	206·76	0·83
36–40 ..	6	231	230	236·05	1·03
41–50 ..	5	224	250	222·79	0·89
51–60 ..	2	108	231	204·90	0·89
61–70 ..	1	63	238	206·48	0·87
71–80 ..	3	217	255	190·99	0·75

HERD-TESTING CHARGES.

In order to gain some idea of the average charge per cow made for herd-testing in the Dominion a query on this point was included in our questionnaire this year. The answers obtained indicate that, on the whole, charges are very reasonable and have evidently been kept as low as possible. Quite a lot of testing-work is being done by dairy companies on behalf of their suppliers free of charge, the expenses being borne by the company in each case. This practice is to be encouraged, and is one which, if given more support, should assist the movement considerably. When a supplier realizes that his dairy company offers a testing service to him free of charge, except that the total cost is an overhead charge on the company and therefore incidentally borne in part by himself, it should be a great incentive for him to join up in the work, even if in a few cases this is done primarily to merely obtain his money's worth. Once participating in the work, the supplier will realize more fully what advantages there are in herd-testing, and never regret the steps his company took to provide the service.

Association System.

In the case of the Association system only one return failed to supply an indication of the charges made, and this represented only a few hundred cows. For 25 per cent. of the total cows tested twice or more under the Association system no direct charge was made—that is, the total cost was borne by the respective dairy companies. The total so represented amounted to 14,851 cows. Of the remainder, 19,804 cows were charged for at the rate of 2s. and 12,905 at 1s. 6d. per head, these being the two commonest charges. In three cases the charge was made on the basis "per test," and taking these at nine periods of testing each, and incorporating them with all those cases where the charge was on the "per season" basis, the average direct charge worked out at 2s. The number of cows represented in this average was 43,034, and this amounts to 72·5 per cent. of the total cows tested twice or more under the Association system. This leaves 2·5 per cent. unaccounted for, and is made up of the one case which did not supply an indication of the charge, and a few associations figured in the Dairy Division Head Office, for which figuring charges only were made. The testing in these cases was not performed by officers of the Dairy Division, and if a charge for testing were made by the dairy companies concerned it would cover testing only. Nearly 8 per cent. of the total cows tested twice or more under the Association system were included in associations conducted as business enterprises by independent testing officers, and the average charge levied was just under 2s. 6d. per head. The most general charge, however, in these cases was that of 2s.

Dairy Company System.

In thirteen cases, representing 1,066 cows, no indication of the charge was supplied, and for ten others (1,704 cows) the charge was nil. For the remaining fifteen cases (2,434 cows) the average charge works out at about 1s. 8d. per head. In eleven of these cases the charge was made on the "per test" basis, and for the remaining four

cases the charge was "per season." In the "per test" cases the season's charge was computed assuming nine periods of testing were done in all cases.

Group System.

In all but one case testing-charges were supplied, and those comprise one for "nil," three on the "per test" basis, and the remaining eighty-one on the "per season" basis. In some cases the charge per season was not a "flat rate" one, and a scale of charges in accordance with size of herd obtained. This complicated the work of computing the average charge, but the result may be accepted as reliable, seeing that the cases so represented were comparatively few in number. The average charge worked out at about 4s. 10d. per head. In those cases where independent testing officers were conducting group herd-testing work as a business enterprise the charge averaged 5s. 1d., the number of cows represented being practically 6 per cent. of the total tested twice or more under this system. In the remainder of cases the testing-work was of a co-operative nature and conducted under a self-supporting or cost basis. The most general charge was one of 5s., and 81,668 cows tested twice or more are thus accounted for, this total being almost 78 per cent. of the total cows tested under the Group system.

Table 15. — Number and Percentages of Cows and Charges classified according to System of Testing, &c., Season 1925-26. (Basis: Cows tested Twice or more.)

Particulars.	System of Testing.			
	Association.	Group.	Dairy Company.	All.
Total number of cows tested twice or more	59,345	105,227	5,204	169,776
Direct charge made—				
Number of cows	43,034	104,262	2,434	149,730
Percentage of total	72·5	99·1	46·8	88·2
Average charge per season (to nearest penny)	2s.	4s. 10d.	1s. 8d.	4s.
No direct charge—				
Number of cows	14,851	215	1,704	16,770
Percentage of total	25·0	0·2	32·7	9·9
Charge not reported, &c.—				
Number of cows	1,460	750	1,066	3,276
Percentage of total	2·5	0·7	20·5	1·9
Co-operative (direct charge made)—				
Number of cows	38,365	98,017	1,221	137,603
Percentage of total	64·6	93·2	23·5	81·1
Average charge per season (to nearest penny)	2s.	4s. 10d.	1s. 4d.	4s.
Private enterprise (direct charge made)—				
Number of cows	4,669	6,245	1,213	12,127
Percentage of total	7·9	5·9	23·3	7·1
Average charge per season (to nearest penny)	2s. 6d.	5s. 1d.	1s. 11d.	3s. 9d.

Summary of Charges.

As a summary of herd-testing charges, and in order that comparison may be facilitated, Table 15 has been compiled. Besides the matter referred to in the text, this table gives an indication of the results for all systems of testing grouped as a whole. It will be observed that the average charge, where direct charges were levied, works out at 4s. per head. This result is affected by the fact that Group herd-testing is represented in the result to the extent of 69·6 per cent., whereas the Association and Dairy Company systems only account for 28·8 per cent. and 1·6 per cent. respectively.

TAPEWORMS AND HYDATIDS.

PRECAUTIONS FOR DOG-OWNERS.

C. S. M. Hopkirk, B.V.Sc., Officer in Charge Veterinary Laboratory, Wallaceville.

Some recent notes on hydatid disease in mankind and in animals, circulated by the New Zealand Health Department, gave a short account of the life-history of the adult tapeworm and its larval bladder-like stage—the hydatid cyst, as it is called. As this parasite is present in many domestic animals it is to the advantage of farmers to know where the adult form is to be found, and in which animals one may expect the cystic stage, so that control may be undertaken with some assurance of success.

The general outline of the life-history of the type is as follows: An adult tapeworm in the intestine of an animal sheds ripe segments which contain many eggs, often running into hundreds or thousands. More segments are continuously ripening, the adult parasite staying in position and absorbing nutriment through its walls from the food in the intestine. A tapeworm is not a blood-sucker, but by means of hooks, which vary in size, shape, and numbers in the different species, is able to attach itself to the walls of the intestine and so resist the excretory movements of the bowels. There are a few tapeworms, however, which do not have hooks, but they (as well as the hooked forms) possess powerful suckers which act quite as serviceably to anchor the worm to the host. As the segment passes along the intestine it disintegrates and the eggs are set free. In only one worm—which is not present in New Zealand as far as is known—does the egg hatch out in the intestine and enter the tissues of the host. Eggs once having reached the exterior in the fæces of the parent host contaminate herbage, vegetables, and water. In the case of dogs, the *Echinococcifer granulosus* egg may reach the hands of human beings caressing these animals, or from the dog licking its anus during cleaning processes and then licking the hands, face, or other parts of the human.

The further life-history of the tapeworm differs in minor ways according to the type of the worm. An egg can grow into the next stage only if it is taken up by the right host, and not all these types have a true cystic stage. However, the common ones in the domestic animals of New Zealand do become hydatids. In these the egg is swallowed

by the intermediate host, and by boring through the intestinal wall after hatching in the stomach the parasite is able to gain the blood-stream, or otherwise bore its way to the position which is most suitable for its growth, and there grow into a bladder-like cyst of simple or compound structure, depending on the species of tapeworm.

Those interested will note in the accompanying table the number of tapeworms which may be found in the dog, this being the principal domesticated carnivorous animal. To the medical world, from the point of view of human health, only one tapeworm is serious in New Zealand, and that is *Echinococcifer granulosus*. This is a very small form, of an average length of about $\frac{1}{4}$ in., but one which during its life-history sets up the condition known as hydatids in human beings. Not all dogs are infested with tapeworms, but those which get access to slaughterhouse offal are generally so. This also applies to farm dogs which get the liver from the sheep killed for the household—the liver being the chief seat of the hydatid in sheep. When an animal eats the hydatid or bladder stage in meat the bladder part disintegrates, and the head is left with the hook and suckers ready for attachment. Segments quickly grow, and the whole worm, depending on the species, may be adult in six to twelve weeks and voiding fertile eggs.

Hosts and Position of Hydatid Cysts.

Adult Host.	Name of Parasite.	Intermediate Host of Cystic Stage.	Name of Cyst.	Position of Cyst.
Man ..	*Taenia solium*	Pig ..	*Cysticercus cellulosae*	Muscle.
	Taenia saginata	Cattle ..	*Cysticercus bovis* ..	Muscle.
Dog	*Taenia hydatigena**	Sheep and cattle Pig	*Cysticercus tenuicollis*	Liver and abdominal cavity.
	*Taenia serrata**	Rabbit ..	*Cysticercus pisiformis*	Abdominal cavity.
	*Taenia ovis**	Sheep ..	*Cysticercus ovis* ..	Muscles.
	*Multiceps multiceps**	Sheep and cattle	*Coenurus cerebralis* ..	Brain.
	*Multiceps serialis**	Rabbit ..	*Coenurus serialis* ..	Between muscles of back.
	*Echinococcifer granulosus** ..	Herbivora and omnivora	*Echinococcus polymorphus*	Liver and lungs.
	*Diphylidium caninum** ..	Man, dog, and horse	..	..
Cat ..	*Taenia crassicollis**	Mouse ..	*Cysticercus fasciolaris*	Liver.
Horse ..	*Anaplocephala perfoliata* and species*	History unknown	..	..
Cattle and sheep	*Moniezia expansa* and other species*	Suspected sheep-tick (*Melophagus ovinus*)	..	..
Birds ..	*Davainea* species (mainly)* ..	Slugs and snails	..	..

* Known in New Zealand.

According to the Health Department, there were treated in the public hospitals of the Dominion last year eighty-eight cases of hydatid disease in human beings, and of these cases eight proved fatal. The trouble is largely due to the negligence of dog-owners. If a dog is fed on good meat or good liver no parasites will result, but if fed on uncooked hydatid-infested livers the health or even lives of the owner and his family and his stock are menaced. By glancing at the table it will be seen that the dog carries the tapeworms which produce "gid" in the sheep when that animal picks up the eggs of the parasite from the grass. Sheep and cattle, and horses, too, have tapeworms in their intestines which have unknown life-histories, though the external

parasites are often considered to be probable carriers of the cystic stage. These tapeworms are of economic importance in their effect on the fattening process of stock for the market, and the unthriftiness of lambs and hoggets which is sometimes due to the parasites.

The domestic fowl also has its tapeworm, the slug and snail acting as intermediate hosts. It is now suspected that quite a number of adult fowls which are apparently normal die suddenly in New Zealand annually as the result of infestation with tapeworms a little larger than pin-heads, and which have encysted themselves in the intestinal wall, so setting up a condition of acute indigestion of the upper alimentary tract. Only the pig is free from the tapeworm, but often suffers as a carrier of hydatids. Not all the tapeworms known exist in New Zealand, but all those in the table, excepting the two infesting man, are known to be present.

The system of meat-inspection carried out in the large public abattoirs in New Zealand is a protection to the town dweller against infested meat for human or animal consumption, but as a further safeguard dog-owners should systematically treat their dogs for tapeworms. Once every three months house-dogs in particular, but working sheep-dogs and cattle-dogs as well, should be dosed with a tæniacide. That most often used is areca nut, 10 grains to 1 drachm, depending on the size of the dog. This should be preceded by a period of starvation for, say, twelve hours, and followed by a purgative, castor-oil being usually given. There are liquid tæniacides on the market which are beneficial and which contain a purgative, and these are usually given, being easily obtained from a chemist. No attempt should be made, however, to dose puppies for tapeworms until they are at least six months old. Puppies may have round worms, but not many tapeworms, before that time, and areca nut may prove too drastic for the young animal.

There are thus several points for the dog-owner to remember and attend to: Keep the dog away from slaughterhouses or from offal of any sort. Feed him on clean meat, or, if the meat is suspected of harbouring hydatids, it should be boiled. Do not allow the dog to be caressed unless you are sure he is clean. Dose the dog regularly every three months, and see that fæces voided following dosage are collected and burned. Thoroughly wash vegetables which are eaten raw, in case of contamination by the dog.

Rabbit Nuisance.—The annual report of the Live-stock Division for the official year 1925–26 states: "Efforts towards the destruction of rabbits have been waged with unabated energy, but, notwithstanding all the efforts put forth and the seemingly satisfactory position attained at the end of winter, the young rabbits again quickly show themselves, and the fight continues as an ever-recurring struggle. In spite, however, of the difficulties encountered we are able to report a considerable reduction in the pest as compared with the previous year. The very wet, cold season during the spring and early summer (1925) assisted considerably in the attainment of this, particularly in the Otago-Southland district, by drowning large numbers of young rabbits. Apart from this, however, the winter and spring months were not suitable for rabbit-destruction by means of poison, and very energetic measures had to be taken during the summer and autumn months to keep the rabbits in check. Rabbit Boards continue, with few exceptions, to do admirable work, and the condition of the pest in the North Island, where considerable areas are now controlled by Boards, continues to be satisfactory, demonstrating that rabbits can be effectively controlled when the co-operative spirit is dominant."

POTATO-GROWING IN NEW ZEALAND.

A STUDY OF PRODUCTION IN CANTERBURY, LOCAL CONSUMPTION, AND EXPORT: SEASON 1925-26.

E. J. FAWCETT, M.A., Fields Division, Department of Agriculture, Wellington.

IN view of the free movement of potatoes during the past season it might be expected that the tendency would be to increase the area under this crop in the Dominion for the current season. Potatoes being a high per-acre yielding crop it is desirable that as large an area as possible be planted, but owing to their perishable nature the total yield needs to be carefully watched. Especially is this the case if the Australian market is not open. It is desirable, therefore, that the industry be reviewed from its several standpoints so that the grower may have some idea of the position. In this article first production, then local consumption, and finally export trade will be considered.

1. Production.

The following data have been obtained from the study of 130 Canterbury farms as regards the season of 1925–26. The total area in potatoes on these farms was 1,523 acres, or approximately one-fifteenth of the estimated Dominion total of 23,470 acres. The yield (table potatoes only) was 8,293 tons, or 5·44 tons per acre, approximately one-fifteenth of the average total for the past ten years. It will be appreciated, therefore, that a representative group has been studied, and the information derived may be considered reasonably sound.

DISTRICTS AND NUMBER OF FARMS IN EACH.

The location of the group units in the province is as follows:—

No. 1—5 farms: North of Ashley River—*i.e.*, Loburn, Balcairn, and Sefton districts.

No. 2—24 farms: Between Ashley and Waimakariri Rivers—*i.e.*, Rangiora, Kaiapoi, Fernside, Southbrook, Clarkville, Coutts Island, and Oxford districts.

No. 3—39 farms: Between Waimakariri and Selwyn Rivers, coast side of main railway-line—*i.e.*, Templeton, Belfast, Ladbrook's, Prebbleton, Halswell, Riccarton, Fendalton, Styx, Yaldhurst, Weedon's, Broadfield, Greenpark, Tai Tapu, Springston, and Lincoln districts.

No. 4—6 farms: As No. 3, but hill side of railway-line—*i.e.*, Darfield and Sheffield.

No. 5—15 farms: Between Selwyn and Rakaia Rivers—*i.e.*, Southbridge, Leeston, Killinchy, Dunsandel, and Hororata districts.

No. 6—8 farms: Between Rakaia and Ashburton Rivers—*i.e.*, Rakaia, Methven, Highbank, and Greenstreet districts.

No. 7—2 farms: Between Ashburton and Hinds Rivers—*i.e.*, Tinwald district.

No. 8—4 farms: Between Rangitata and Opihi Rivers—*i.e.*, Temuka district.

No. 9—5 farms: Between Opihi and Pareora Rivers—*i.e.*, Washdyke, Levels, Kingsdown, and Normanby districts.

No. 10—21 farms: Between Pareora and Waitaki Rivers—*i.e.*, Waimate, Studholme, Willowbridge, Morven, Glenavy, and St. Andrew's districts.

One farm—District not given.

YIELD BY DISTRICTS.

Of the 130 farms, 60 are above the average in yield, and 70 below, as under :—

District.	Farms above Average.	Farms below Average.	District.	Farms above Average.	Farms below Average.
No. 1	2	3	No. 8 ..	1	3
No. 2	12	12	No. 9 ..	2	3
No. 3	16	23	No. 10 ..	12	9
No. 4	3	3	Not named ..	1	..
No. 5	7	8			
No. 6	4	4			
No. 7	..	2	Totals ..	60	70

The number of farms by districts, above and below the general average, is shown in the following table :—

District.	Farms above Average.	Farms below Average.	District.	Farms above Average.	Farms below Average.
No. 1.			*No. 5.*		
Balcairn ..	1	..	Dunsandel ..	..	3
Loburn ..	..	1	Hororata ..	1	..
Sefton ..	1	2	Killinchy ..	1	2
			Leeston ..	1	..
No. 2.			Southbridge ..	4	3
Clarkville ..	..	1			
Coutts Island ..	1	..	*No. 6.*		
Fernside ..	..	1	Greenstreet ..	2	..
Kaiapoi ..	1	2	Highbank ..	1	2
Oxford ..	1	..	Methven ..	1	..
Rangiora ..	9	7	Rakaia ..	..	2
Southbrook ..	..	1			
			No. 7.		
No. 3.			Tinwald ..	..	2
Belfast ..	2	..			
Broadfield ..	..	1			
Fendalton ..	..	1	*No. 8.*		
Greenpark ..	2	..	Temuka ..	1	3
Halswell ..	1	..			
Ladbrook's ..	3	..			
Lincoln ..	..	1	*No. 9.*		
Prebbleton ..	2	3	Kingsdown ..	..	1
Riccarton ..	..	2	Levels ..	1	..
Springston ..	1	6	Normanby ..	..	1
Styx	1	..	Washdyke ..	1	1
Templeton ..	1	2			
Tai Tapu ..	3	1			
Weedon's ..	..	3	*No. 10.*		
Yaldhurst ..	..	3	Glenavy ..	1	1
			Morven ..	1	2
			Studholme ..	1	3
No. 4.			St. Andrew's ..	3	3
Darfield ..	2	2	Waimate ..	3	..
Sheffield ..	1	1	Willowbridge ..	3	..

Note.—The above figures cannot be taken as indicative of the districts named in every case.

METHOD OF PLANTING.

The majority of the larger areas are planted by machine, but the plough still seems to be the most-generally-used implement. There is no appreciable difference in the cost of planting, and the fact that every farm is equipped with a plough will tend to keep it in favour for this work. The method of planting does not appear to affect the yield appreciably. Details as to method are as follows :—

		Per Cent.
Planted with plough	75 farms	= 57·7
Planted with machine	52 farms	= 40·0
Planted by hand	3 farms	= 2·3
	130	100·0

SEED.

The weight of seed planted varies from 8 cwt. to 20 cwt. per acre, the average being 16 cwt.

Cutting of seed is not practised to any extent. Planting whole seed effects a great saving of time, and where potatoes are kept for the following season's planting a few hundredweight more or less is not an important item. It is considered, however, that cutting seed tends to keep the strain pure. Having regard to the results obtained by the Department of Agriculture a few years ago in tests conducted at Ashburton with cut *versus* uncut seed, it is almost certain that the increased yield from uncut seed will more than compensate for the extra weight of seed used. On the 130 farms under review the position is as follows :—

		Per Cent.
Whole seed	123 farms	= 94·6
Cut and whole	6 farms	= 4·6
All cut	1 farm	= 0·8
	130	100·0

MANURE USED.

The use of artificial manures on the potato crop is not general. Of the 130 farms, manure was used on 53 only, or 40·8 per cent. of the whole. The average weight used was 3 cwt. per acre, the different kinds of manures being as follows :—

		Per Cent.
Potato-mixture	26 farms	= 49·1
Superphosphate	19 farms	= 35·9
Blood-and-bone	4 farms	= 7·5
Ephos phosphate	4 farms	= 7·5
	53	100·0

The use of manures was confined almost entirely to farms in the districts of poorer soil, and the yields, therefore, cannot be compared.

PLACE IN ROTATION.

It is apparent that in a rotation potatoes are quite important as a cleaning-crop after grass in the preparation of wheat land. For this reason it is difficult to estimate their value, as they may easily take the place of an expensive and comparatively unremunerative fallow.

Particulars of preceding and following crops on the farms under review are as follows :—

Preceding Crop.	Number of Farms.	Percentage of Total.	Following Crop.	Number of Farms.	Percentage of Total.
Grass	99	76·15	Wheat	81	62·31
Wheat	10	7·69	Oats	12	9·23
Oats	5	16·16	Peas	7	28·46
Peas	4		Grass	5	
Turnips	3		Mangolds ..	4	
Potatoes	2		Turnips	4	
Mangolds	2		Potatoes	3	
Tares	2		Barley	2	
Fallow	2		Onions	1	
Barley	1		Linseed	1	
			Tares	1	
			Indefinite ..	9	
Totals ..	130	100·00		130	100·00

VARIETIES GROWN.

Of the 130 farms there were sixteen definite varieties grown on 83 farms, the remaining 47 being mixed. Arran Chief holds pride of place, and as an all-round potato appears to warrant its position. An analysis of the varieties, showing their position in relation to the whole —their average yield of table potatoes and the percentage of seed and small to their total yield—is self-explanatory.

Variety.	Number of Farms.	Percentage of 130 Farms.	Number of Farms above General Average Yield.	Number of Farms below General Average Yield.	Average Yield of Table Potatoes.	Percentage of Small and Seed to Whole.
					Tons.	
Arran Chief	37	28·48	22	15	6·21	29·00
Bresee's Prolific ..	9	6·92	5	4	5·45	28·30
Magnum Bonum ..	6	4·68	4	2	6·50	23·30
Dakota*	5	3·84	1	4	4·81	32·30
Up-to-Date	5	3·84	3	2	6·80	32·50
Aucklanders* ..	4	3·07	1	3	4·34	36·75
Various definite varieties	17	13·07	7	10	5·60	34·80
Mixed	47	36·10	17	30	6·21	29·00
Totals	130	100·00	60	70	..	..

* Dakotas and Aucklanders are generally claimed to produce a very low percentage of seed potatoes; the farms studied were probably not representative of these varieties.

So far as the named varieties are concerned, there are not enough of any one to make a fair comparison with Arran Chief. Magnum Bonum has yielded better, and has a lower percentage of small potatoes. It will be noticed that "mixed" varieties equal Arran Chief in both yield and percentage of small, a number of very high producers being in this category. Where mixed varieties are classified, Arran Chief appears twelve times, and is therefore associated with a large

proportion of this class. Various definite varieties include the following: Gold Coin (3), British Queen (3), Britain's Best (2), Gamekeeper (2), Lady Fife (2), Endurance (1), Northern Star (1), Sutton's Abundance (1), King Edward (1), Early Regent (1).

On the 130 farms the average cost of ploughing, disking, grubbing, harrowing, rolling, ridging, planting, cultivating, and moulding works out at £4 7s. 6d. per acre. Digging, sorting, bagging, and cartage to sheds or pits averages £1 2s. 6d. per ton. If pitted and rebagged the added expense is 13s. 9d. per ton, and average cartage to rail 5s. 8d. per ton.

SUMMARY OF PRODUCTION POSITION.

If an arbitrary figure of £2 5s. per acre is set for seed (16 cwt. average seed used), the production position may be summarized as follows:—

	Totals.	Average per Farm.
Acreage of farms studied	24,416 acres	187·815 acres.
Acreage under potatoes	1,523 ,,	11·715 ,,
Yield	11,903 tons	91·561 tons.
Table potatoes	8,293 ,,	63·792 ,,
Seed potatoes	2,639 ,,	20·300 ,,
Small potatoes	971 ,,	7·469 ,,

Yield per acre: Table potatoes, 5·445 tons; seed potatoes, 1·740 tons; small potatoes, 0·630 ton. Percentage seed and small (of whole crop), 30·329; percentage seed only (of table and seed), 24·140.

Table potatoes: Sold, 7,062 tons (from 124 farms); exported, 3,445 tons (from 83 farms); sold locally, 3,617 tons (from 88 farms); on hand, 1,231 tons (from 82 farms).

Cost f.o.r. off forks (sacks extra): Per acre, £20 10s.; per ton, £2 17s. 1d.

Cost f.o.r. from pits (sacks extra): Per ton, £3 10s. 10d.

Average price per ton received for 7,062 tons sold, £4 11s. 4d.

Value of table potatoes per acre at £4 11s. 4d. per ton, £24 17s. 4d.

Profit per ton on table potatoes if seed sold at cost, £1 14s. 3d.

Profit per acre if all potatoes sold, £9 6s. 6d.

The marketing of the crops from the farms studied (10th September last) is as follows:—

Farms holding all their potatoes	6
Farms selling for export only	36
Farms selling for local consumption only	41
Farms selling for export and local consumption	47
	130

It will be seen from the foregoing data that the cost of producing potatoes averages £2 17s. 1d. per ton (table and seed only considered). The cost of the 16 cwt. of seed used per acre is therefore £2 5s. 7d. instead of £2 5s.

The average yield of table tubers is 5·445 tons per acre, giving a return of £24 17s. 4d. per acre, and 1·74 tons of seed potatoes, which at cost price would return £4 19s. 2d. per acre, giving a total value per acre of £29 16s. 6d., or a profit of £9 6s. 6d.

It must be appreciated, however, that to realize this profit the whole of the seed potatoes need to be sold at not less than £2 17s. 1d. per ton, and table potatoes at an average price of £4 11s. 4d. Should the price obtained drop below this level, profit will be reduced accordingly.

On 82 farms an average of 15 tons of table potatoes remains on hand. These will cost 13s. 9d. per ton for re-sorting and bagging—to say nothing of losses in re-sorting. Therefore on these farms the costs will be increased by approximately 18s. per acre on the whole area.

If £4 11s. 4d. per ton be taken as a standard price for table potatoes, and £2 17s. 1d. for seed potatoes, then 35 of the 130 farms, or 26 per cent., show an actual loss on the crop. Many of the low per-acre producing farms have sold at a price higher than the average, or have produced at a lower cost, so actually the farms selling at a loss represent less than 26 per cent.

Table potatoes, then, cost approximately £3 per ton to produce and deliver f.o.r. (sacks extra). On the past season's standard of production some farmers may, if doing their own work, sell at that price and make wages. But it is not safe to work on this margin, as a very small percentage of waste in pitted or in seed potatoes may easily result in a loss. At £4 11s. 4d. per ton the majority of the farms producing less than 4 tons of table potatoes per acre are actually not making wages.

Low per-acre yields have the added disadvantage of giving a high proportion of seed and small potatoes. On the farms under review the percentage for those above the average yield is 25·9, whereas for those below the average it is 34·7. In other words, the smaller the crop the higher is the proportion of small potatoes.

Reduced to a debit and credit account the position is as follows :—

Costs and Proceeds of 1 Acre of Potatoes, Season 1925–26.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Ploughing	1	4	9	By Table potatoes, 5·44 tons	24	17	4
Disking	0	7	0	at £4 11s. 4d. ..			
Grubbing	0	6	9	Seed potatoes, 1·74 tons			
Harrowing	0	4	0	at £2 17s. 1d. ..	4	19	2
Rolling	0	3	0				
Planting	1	1	0				
Cultivation	0	15	0				
Moulding	0	6	0				
Digging and carting to sheds (£1 2s. 6d. per ton for 7·8 tons) ..	8	15	6				
Cartage to rail (5s. 8d. per ton)	2	4	0				
Seed potatoes, 16 cwt. ..	2	5	0				
Manure	0	8	0				
Land (average £36 per acre at 6 per cent.) ..	2	2	0				
Rates, taxes, and upkeep	0	8	0				
Net profit per acre ..	9	6	6				
	£29	16	6		£29	16	6

The above is worked on the average of the 130 farms. For that reason it may be difficult to reconcile some of the figures. Where a farmer is doing his own work the preparation for potatoes fits in very well with his other activities, and provides occupation for his team which otherwise may be idle. On this account it may be claimed that the actual cost is less than shown above. On the other hand,

where dirty land is being prepared for potatoes a great many workings may be given. This perhaps applies in the majority of cases on heavy land.

2. Local Consumption.

Our annual potato crop is disposed of through the following channels: Table use locally, export for table use, as seed for the following season, as feed for stock, or as waste. The small potatoes are seldom wholly consumed, and may be looked upon as waste, representing 8·125 per cent. of the total yield. Seed potatoes, representing 24·14 per cent. of the remainder, are used partly as seed and partly for table purposes. In the past season the average production per acre of seed potatoes was in the vicinity of 1·74 tons, and as the average weight of seed planted is 16 cwt., 18·8 cwt. per acre remained for human consumption.

The Government Statistician gives in the Official Year-book the acreage and total yield of potatoes. It must be clearly understood that these figures apply to potatoes grown outside boroughs, and do not account for small garden plots grown for family use. As each year's figures are tabulated on the same basis, however, they are quite comparable.

Taking an average of the years 1917 to 1925 the position is as follows:—

Area (average for nine years)	22,093 acres.
Production (total average for nine years) ..	118,311 tons.
Exports (total average for nine years) ..	1,613 tons.
Imports (total average for nine years) ..	172 tons.

Consumption, then, takes place as follows:—

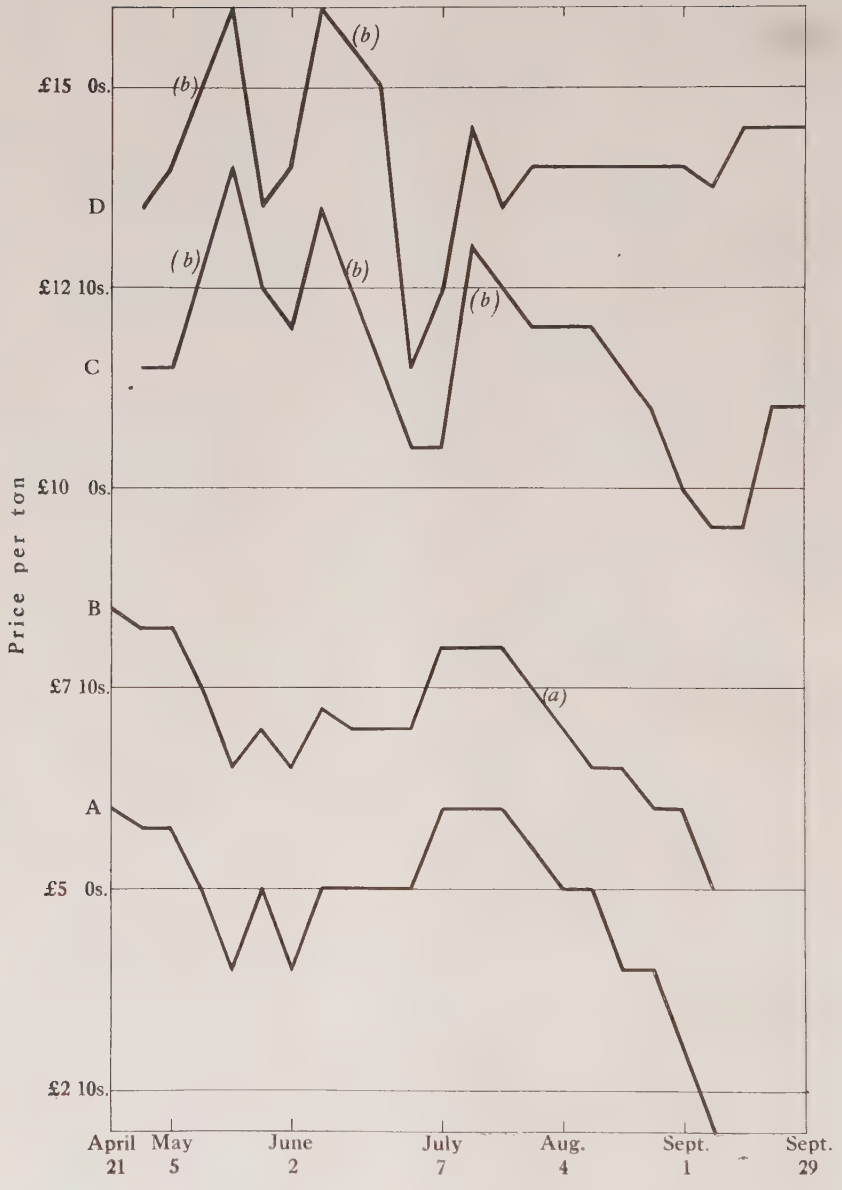
	Tons.	Tons.
Total crop	..	118,311
Small potatoes (8·125 per cent. of whole) ..	9,613	
Used for seed	17,674	
Exported	1,613	
Human consumption in Dominion	89,411*	
		118,311

* Locally grown, 89,411 tons; imported, 172 tons.

Calculated on the average estimated population, this gives a per-head consumption of 157 lb. per annum. If the estimated yield for the past season is reliable there is likely to be a surplus.

3. Export Trade.

Up to 1st October this year the amount of potatoes exported is in the vicinity of 16,500 tons. Had there not been such a demand from Australia the position would have been very serious. On the information available it is impossible to say what the Australian market is likely to be for the present season (in 1927). For the last seven years (1918–19 to 1924–25) the area planted in the Australian States has fluctuated between 110,000 and 150,000 acres, with an average of 131,000 acres. The yield has varied from 260,000 to 448,000 tons, or an average of 345,000 tons. For ten years previous to 1923 the average yield of potatoes in the Australian States was 2·52 tons per acre. The Commonwealth Year-book does not indicate whether this is total yield or table potatoes only. It is quite



GRAPH SHOWING POTATO-PRICES AT CERTAIN POINTS, SEASON 1925–26.

A. Prices to farmers, f.o.r. country stations, Canterbury (sacks extra).
B. Prices to merchants, f.o.b., s.i., Lyttelton–Australia trade.
C. Selling-price of New Zealand potatoes on Sydney market.
D. Selling-price of Tasmanian potatoes on Sydney market.

NOTES.—(*a*) No buyers; (*b*) prices not available.

apparent that with a low average yield good seasons may influence the total crop enormously. Between 1919 and 1925 Australia's imports have only once exceeded exports—namely, in 1920, when there was a surplus of 1,100 tons in favour of imports. It is estimated that the annual consumption per head in Australia is 126 lb. Allowing for seed reserve, it would appear that Australia needs approximately 360,000 tons per year.

The accompanying graph shows the relative prices prevailing at different dates. It will be seen that the price f.o.r. country stations, and the price f.o.b., s.i., Lyttelton, maintain a fairly uniform position. The expenses incurred by the local merchant, including sacks, railage, wharfage, grading, branding, and brokerage, amount to £1 7s. per ton. The price f.o.b., s.i., Lyttelton, and that realized for New Zealand potatoes in Sydney shows acute differences. The expense incurred by the Sydney merchants in freight, duty, Sydney inspection, harbour dues, brokerage, and incidentals is approximately £3 18s. 6d.

Tasmanian potatoes maintain a higher level than New Zealand tubers on the Sydney market. It may appear at first glance as though both local and Sydney merchants have been making excessive profits, but really such has not been the case. It must be realized that these are the prices offered at comparable dates, but business may not have been done. Most of the potatoes for export were bought forward at high prices, and it is possible that merchants actually lost on the transaction.

The fall in prices from last July onwards is traceable to (*a*) appreciation of the fact that a carry-over was certain, and (*b*) speculation. To what extent overselling on the part of speculators was responsible for the drop it is difficult to say, but it is quite conceivable that overselling at prices below the ruling price must force the market down when a surplus is known to exist. A drop in prices was inevitable with such an oversupply. The exploitation of the market by keen judges of the position tends to flatten out fluctuations in price rather than allow the fall to be sudden and drastic at perhaps a later date; but which method is best in the interests of the grower is a question.

Summary and General.

It appears that the average potato-grower of Canterbury can produce potatoes at approximately £3 per ton if the season is favourable. If the Australian market is closed an area of 22,000 acres will, on the average, supply local demands.

The cost of growing potatoes and putting them on the Sydney market is at present £8 5s. per ton. Allowing 10s. per ton for local merchant's margin and the same for the Sydney merchant, it would appear that New Zealand potatoes may be put on the Sydney market at approximately £9 5s. per ton. The farmer, however, should be allowed at least 15s. per ton above cost of production to cover possible wastage, which brings the price at which New Zealand can enter the market to £10 per ton.

A study of the position suggests that a considerable amount of experimental work needs doing on the potato crop, especially with regard to pure-seed and variety trials, the value of different manures, and the effect on the next crop in the rotation.

PUWERA GUM-LAND EXPERIMENTAL FARM.

NOTES ON OPERATIONS, SEASON 1925–26.

T. H. PATTERSON, H.D.A., Instructor in Agriculture, Auckland.

DAIRYING.

THE feature of greatest interest to all concerned with the development of the clay gum-lands since the establishment of the Puwera experiments is probably the first year's experience with the small dairy herd milked on the farm last season. All the nine heifers and five cows—all grade Jerseys—were tested, and the average test, based on figures supplied by the Whangarei Co-operative Dairy Company, worked out at 220 lb. of butterfat per head. The carrying-capacity of the land proved to be slightly over 2 acres per beast. These results in the first year of dairying are regarded as very satisfactory, considering the conditions which had to be contended with. Most of the animals calved between the middle of September and early October, two coming in as late as November. The late start was therefore an initial handicap.

Weather conditions throughout the season were unfavourable. The spring was late and characterized by cold winds and squalls, which were trying to the dairy stock. When the weather did take up in December it set in hot and dry. The continued dry spell seriously hampered the water-supply, which was drawn from a creek below the dairy-shed. The hill paddocks are watered from a surface spring, which, unfortunately, dried up for the first time since our occupation of Puwera. According to old gum-diggers near-by who have used the same spring, this was its first failure in fifty years. There was plenty of feed on the pastures—in fact, one could not help but notice the contrast presented by the greenness and succulence of the grass on Puwera and that seen on the volcanic lands when the summer drought had browned the surrounding country. But though the pastures supplied adequate feed, and this was supplemented by green fodder crops and soft turnips, the milk-yield went down even in December. The cause was clearly lack of sufficient water, an adequate supply of which is, of course, a prerequisite to successful dairying.

SOME OF THE YOUNG DAIRY STOCK AT PUWERA FARM.

Two members of the herd tested last season have been culled, and six good-type Jersey grade heifers added, together with three extra cows, making the herd total for the current season twenty-one. The herd could be further strengthened if the water-supply were better.*

BREAKING-IN OF VIRGIN AREA.

Another feature of interest in the year's work was the breaking-in of a new area of 30 acres of virgin gum-land of an undulating to hilly nature. This is situated on the north-western side of the creek which divides the farm. The preliminary cultivation of the new area was similar in general to that which gave such good results on the older part of the farm, but was modified in order to reduce the number of operations performed and the period for which the land lay in fallow, thereby saving time and cheapening the breaking-in process. The new area was ploughed once only, instead of twice as with older fields. The length of the fallow was not longer than six months, which represented half the usual period allowed heretofore. The area was not subsoiled. The usual surface cultivation was followed with a liberal use of the spring-tine cultivators, in addition to disks, to secure good tilth just below the surface and a somewhat cloddy upper layer—an essential mechanical condition to prevent a hard crust forming on top of the stiff soil.

The grass-seed mixture (consisting mainly of rye-grasses, paspalum, crested dogstail, and clovers, also including ½ lb. of subterranean clover) and the manuring were substantially the same as on the best of the fields on the older area, but liming was reduced to 10 cwt. of ground limestone per acre, and a portion received no lime. The take of grass was quite satisfactory, and the pasture throughout the spring presented the appearance of being most promising. It remains to be seen whether the shorter and cheaper process produces results equal to those attained on the older fields. If it does, then it will considerably reduce breaking-in costs.

PASTURE GRAZING THROUGHOUT THE SEASON.

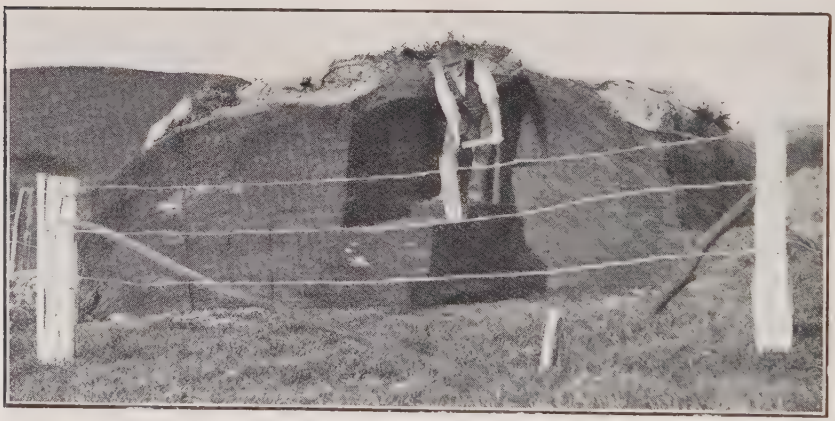
The pastures are, of course, the mainstay of Puwera. All the known good methods of pasture-management are employed to secure the most profitable results. Top-dressing; tripod-chain harrowing; mowing, to prevent the pastures "getting away"; small paddocks, to allow of alternate grazing and spelling; feeding out roots and fodders on the upland pastures from crops grown on the flat—these in the main are the chief features of the pasture-management. Annual top-dressing, principally with basic slag at the rate of 2½ cwt. to 3 cwt. per acre, is practised. First-class pastures are thus maintained by practices used in almost every district in New Zealand where dairying is intensive, and, moreover, they are within the means of any ordinary farmer. Perennial rye-grass and clover are the main constituents of the pastures.

Paspalum as a dominant constituent only shows up prominently in December and afterwards. It is a fact worthy of attention that where the pastures consist chiefly of rye-grasses, paspalum, and clovers, and are top-dressed regularly each season, the consistent vigorous growth of rye-grass is actually tending to hold paspalum in check. In fact,

* Authority has now been given for an expenditure of £100 on a bore for water.

as just mentioned, from early August till December the pastures are to all appearances rye-grass and clover pastures; but when cut for hay or silage, or grazed heavily, paspalum then shows up prominently and supplies the chief feed till May, and in some seasons even well into June. Thus a long season of grazing is provided by such a succession if the management includes top-dressing and the other practices already referred to. On Field 6 there is still a vigorous growth each season of Western Wolths rye-grass before the paspalum comes away.

Another matter which receives attention at Puwera is very light stocking in the spring of pastures sown in the previous autumn. It is a practice which encourages deep rooting, and this, added to the benefits accruing from phosphatic manuring, gives the grasses the power to withstand continued dry weather, to remain succulent and green when other pastures not so treated are dry, and to retain the close turf so essential to a good sward more or less free of weeds. Moreover, the permanence of such a sward is influenced in the right direction by a little nursing in the early life of the pasture. Modern research bears out the soundness of this practice.



SILAGE AT PUWERA.

For cutting out blocks of silage from the stack a knife with each side of the broad V-shaped point sharpened is used, allowing easy entry.

SUPPLEMENTARY FEED.

With the mild winters obtaining in North Auckland, and the pasture-management practised at Puwera, a long period of productive grass-growth is secured. The need, therefore, for special crops becomes less than farther south. The Puwera pastures are pieced out by saving hay and silage from the spring surplus. This practice, where paspalum forms the chief feed after December, is very beneficial to the pasture, as short, quick-growing paspalum and clovers form ideal feed for dairy cows at that time of the year. It was a notable fact at Puwera last season that the cows milked better on the paspalum field, which was cut for silage in early January, than when fed with millet or, later, green maize and sorghum. We find, however, at Puwera that it pays to have maize and sorghum as a standby because of the high yield per

acre of green feed from these crops. The amount of hay per dairy cow used at Puwera last season was 15 cwt., and we had 17½ tons of matured silage cut from 8 acres. At a ration of about 40 lb. daily per cow the silage provided the herd with two months' supply. Only one-third of the stack was used in the early spring, and the remainder is being held for a possible dry spell in the autumn.

Mangolds and swedes, together with hard turnips sown in February on oat stubble, provide winter roots, which are fed with hay. The only other supplement to the pasture is green oats, fed in the early spring before the pasture begins to move appreciably. A good combination used at Puwera was 1½ bushels of Algerian oats sown with 25 lb. of grass-pea and 4 lb. of crimson clover. The crop was cut for hay after several grazings. Oats are grown each season for chaff to supply horse-feed.

With the use of paspalum and kikuyu-grass for late summer and autumn feed, the area devoted to special crops at Puwera is greatly reduced. Other than a small area of maize and sorghum, together with the silage already referred to, no extra cropping should be needed. The problem for the average North Auckland farmer, especially on the better soils, should be even easier of solution than at Puwera.

KIKUYU-GRASS.

After about three years the kikuyu pasture on Field 2 became sod-bound. The mass of turf was turned under by the mouldboard plough in the middle of August, received three strokes of the disk harrows early in September, and was sown with the following seed mixture: Italian rye-grass, 12 lb.; red clover, 6 lb.; Lotus major, 1 lb. per acre. Superphosphate, 2 cwt., and blood-and-bone, 1 cwt., per acre, were applied with the seed. It is expected that this procedure will rejuvenate the kikuyu-grass and at the same time provide a temporary grazing resulting from the mixture sown.

The amount of feed provided by the kikuyu-grass during the three seasons from the original sowing was beyond expectation. Kikuyu, when used with red clover or Lotus major, each of which is able to keep pace with kikuyu in the summer, when the growth of the latter is very rapid, makes a good sward. White clover, on the other hand, is smothered unless the pasture is kept short by very heavy stocking, in which case the kikuyu and white-clover combination is an excellent one, as seen at Puwera where a plot was so treated. In fact, it is rather interesting to record that no white clover or manure was sown, but the kikuyu merely kept grazed hard on a small plot of pure danthonia where the kikuyu had been introduced. On the kikuyu plot the white clover has come in voluntarily, and the combination forms a green succulent sward in contrast to the adjoining danthonia, which is dry and uninviting and with no white clover present.

Where a few acres of kikuyu were put down in Field 4 (by broadcasting shoots chopped up with a sharp spade) on a surface only double-disked the grass has taken rather well. Combined with rye-grass and clovers the sward, which was manured with phosphate, is now providing good feed. Probably a better method of preparing the kikuyu would be to put the jointed stems loosely through a chaffcutter, allowing for a

long cut, and then broadcast on a disked surface. A small seeding of rye-grasses and clovers with Lotus major should be added.

As our experience grows with kikuyu-grass it only confirms our early results—that kikuyu has proved a valuable introduction and has added a further useful species of economic value to our grass-lands, especially on areas where the summer is warm and dry and English grasses become unproductive. Like paspalum, it is a very vigorous grower and is highly productive, but, as it has not seeded so far, it can be more easily controlled.

OPEN-AIR PIG-RAISING.

Two pedigree Berkshire sows were purchased at Ruakura State Farm and were put at Puwera in the early spring. They are Dominion Mira and Dominion Palmdale—maiden sows served by Dominion Scholar, one of the best Berkshire sires at Ruakura. One has farrowed and the other is due shortly. The pigs are run on the

PIG-RUNS WITH MOVABLE HOUSES AT PUWERA.

open grazing system with movable pig-houses. Rye-grass and clover pastures are provided, and this is supplemented by special crops in season. Artichokes are growing and will be fed off. Mangolds, turnips, &c., were provided for spring feed. Skim-milk, of course, is fed daily. There is a demand among farmers for good stud Berkshires in North Auckland.

FARMERS' VISITS.

The Puwera Farm is still performing a useful function as a centre for the practical demonstration of approved methods of general farm practice, and as a meeting-ground for farmers in the district and from other districts in North Auckland for the dissemination of useful knowledge. On one field day during the period of the winter farm-school held last in May eighty-six farmers inspected the area, under the guidance of the Instructors.

UTILIZATION OF GUM-LANDS IN GENERAL.

Good pasture can be established and maintained economically on the gum-lands where no hard-pan exists near the surface. A suitable rotation of crops can also be grown to supplement the feed from the pastures. The land can be broken in at a cost that makes dairying profitable at price levels obtaining even during the past three years. Water has proved a difficulty at Puwera, but it may be possible to get water by boring. This course is worthy of investigation. The usual sources of water-supply are springs and the running streams. Surface springs are well distributed over the clay gum-lands, and there are some good streams giving unfailing supply. However, the surface springs are not always reliable, as has been the case at Puwera and elsewhere. Unless water can be secured by boring, then the settlement of gum-lands, except along the permanent streams and where reliable surface springs are found, will be hampered.

Provided the water difficulty were solved satisfactorily, the utilization of gum-lands would bring about a considerable increase in production in the Auckland Province. If only half of the unoccupied area were settled, and each section comprised 200 acres, this would represent a potential increase in butterfat, at 200 lb. per cow, of 1,250,000 lb. Moreover, new settlers would be added to the land population. These figures are based on a low estimate—namely, the butterfat returns from Puwera for the first year of dairying. When the herd is improved and brought up to a higher standard, the butterfat returns may be expected to largely exceed the figures mentioned.

Even if the general settlement and development of gum-lands are not undertaken for years to come, the Puwera experience shows the potentialities of what are regarded as the very poorest soils of the province. From the results obtained it is clear that farmers are not exploiting the occupied good lands to anything like the extent to which such lands are capable of producing. In the application of better methods to the older occupied farm lands of North Auckland lies a means of greatly increasing production without the alternative course of settling an acre of unimproved gum-land. The usual development in most young countries is for the two courses to proceed simultaneously.

SHEEPOWNERS AND FLOCKS.

THE annual sheep returns for 1926 show the following figures: North Island—11,381 owners, 13,830,250 sheep; South Island—13,664 owners, 11,074,743 sheep; Dominion totals, 25,045 owners and 24,904,993 sheep. The size of flocks for the Dominion is indicated as follows: 1 to 200 sheep, 5,916 owners; 201 to 500 sheep, 6,416; 501 to 1,000 sheep, 5,732; 1,001 to 2,500 sheep, 4,858; 2,501 to 5,000 sheep, 1,452; 5,001 to 7,500 sheep, 369; 7,501 to 10,000 sheep, 163; 10,001 to 20,000 sheep, 120; 20,001 sheep and over, 19 owners.

Work of Wallaceville Veterinary Laboratory.—"During the year," states the Officer in Charge in his annual report for 1925–26, "3,513 specimens were examined, the number for the previous year being 2,649. The increase has been an all-round one, and is due, I believe, to an increased feeling of confidence in the efforts of the Laboratory staff, rather than to an increase in disease. As more specimens have been forwarded, just so has the educational value of the Laboratory been advanced."

ASHBURTON EXPERIMENTAL FARM.

WORK OF THE 1925–26 SEASON.

J. W. HADFIELD, H.D.A., Instructor in Agriculture, Christchurch.

THE usual high standard of experimental work was maintained at the Ashburton Farm during the agricultural year of 1925–26, under the able working management of Mr. J. G. McKay. The planning of the work was carried out by Mr. F. E. Ward, late Instructor in Agriculture, and Mr. A. W. Hudson, Instructor in Agriculture, Christchurch. Details of yield and comments on tabulated data incorporated in this report have been supplied by Mr. Hudson, who is specializing in such work. For notes on operations in the season of 1924–25 reference may be made to the *Journal* for September, 1925.

COCKSFOOT FOR SEED.

This stand is now six years old, having been sown in October, 1921, in rows 24 in. apart. The yield of seed last harvest was very poor, and the stand would appear to have outlived its usefulness. The area will therefore be surface-sown with rye-grass and clover, and utilized for hay or pasture.

LUCERNE STANDS.

Grazing trials of lucerne have been continued, affording conclusive evidence of the value of this crop under Canterbury conditions. Although certain areas have been grazed on almost every occasion since they were sown in March, 1921, there is very little evidence of deterioration due to grazing, but nevertheless such evidence is directly proportionate to the extent of grazing carried out.

Lucerne is no exception to the general rule governing pasture, in that its productiveness is regulated by seasonal conditions and the class of land on which it is grown. Nevertheless, our present experience would indicate that once established it carries so much more stock than anything else of a permanent nature could do on the medium lands of Canterbury that every endeavour should be made by farmers to establish larger areas for grazing purposes. The following grazing returns afford some indication of the carrying-capacity of the lucerne stands at Ashburton :—

Area of 20 Acres.

9 acres divided into three blocks, grazed as follows : Sept. 11–Dec. 31, 120 hoggets for 112 days ; Jan. 1–18, 112 hoggets for 18 days ; Feb. 4–12, 127 hoggets for 9 days.

11 acres reserved for hay ; cut twice, yielding 29 tons of hay.

Thereafter the total area of 20 acres grazed as follows : Feb. 12–16, 254 sheep for 4 days ; Feb. 17–Mar. 14, 208 sheep for 26 days.

The grazing of this area is equivalent to $3\frac{1}{5}$ sheep per acre per annum and 29 tons of hay for winter feeding. Allowing $2\frac{1}{2}$ lb. lucerne chaff per head per day during the winter, this area of 20 acres would carry an equivalent of 128 sheep for six months in summer and 140 sheep during the six winter months (supplemented by winter grazing).

Area of 13 Acres.

Block 1, grazed as follows: Sept. 25–Oct. 8, 168 sheep for 13 days; Oct. 21–Nov. 5, 168 sheep for 15 days; Nov. 17–23, 53 sheep for 6 days; Nov. 24–28, 161 sheep for 5 days; Nov. 29–Dec. 12, 38 sheep for 14 days; Dec. 28–31, 51 sheep for 3 days.

Block 2, grazed as follows: Sept. 30–Oct. 7, 200 sheep for 7 days; Oct. 8–17, 171 sheep for 10 days; thereafter closed and cut once, yielding 8 tons of hay.

Thereafter the total area of 13 acres grazed as follows: Jan. 31–Feb. 17, 190 sheep for 17 days; Mar. 3–20, 150 sheep for 17 days; Mar. 23–28, 120 sheep for 5 days.

The grazing of this area represents a carrying-capacity of $3\frac{1}{8}$ sheep per acre per annum, and a yield of 8 tons of hay for winter feed. Allowing $2\frac{1}{2}$ lb. of lucerne chaff per head (supplemented with winter grazing), the carrying capacity of the 13 acres is equivalent to 87 sheep for the six summer months and 40 sheep for the six winter months.

In connection with the feeding of lucerne chaff Mr. McKay reports: "Our experience on the farm has been confined to hand feeding during actual winter months only, when it was found that at least ten ewes per acre could be carried in good health on light land with a supplementary ration of $2\frac{1}{2}$ lb. of lucerne chaff per sheep per day. We cannot at present say for just how long this, or heavier stocking, could be carried on without ill effects to the health of the sheep where lucerne chaff alone is being fed."

PURE LINES OF SEED.

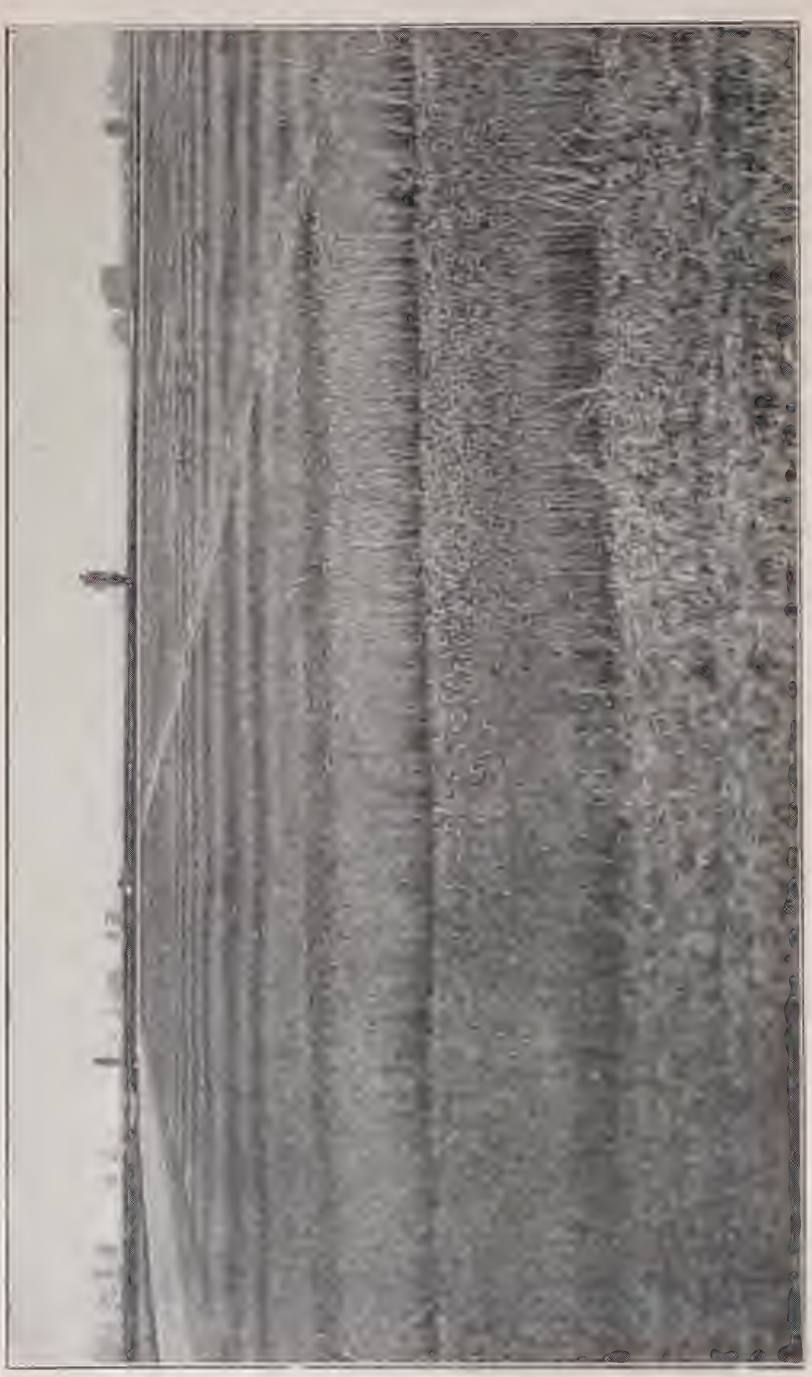
The pure line of Dreadnought wheat selected in the preceding season by Mr. McKay (*Journal*, September, 1925, page 153) has been sown in an increase plot, and the produce from this should form a valuable nucleus in pure-seed production for the farmers of North Otago. Mr. McKay has also raised by careful selection pure lines of the three most important varieties of potatoes in Canterbury namely, Arran Chief, Bresee's Prolific, and Dakota. It is intended to pay close attention to this aspect of the work in future.

WHEAT VARIETY TRIAL.

A continuation was made of the trial of wheat varieties commenced in the preceding season, each variety again being checked against College Hunter's as the standard. The Hunter's used in the season under review was obtained direct from Lincoln College, having been grown there in the previous season. The product of this will be used as the control variety in the future.

Six replications of each variety were sown with control of College Hunter's immediately alongside each varietal plot. This was obtained by sowing every third plot with College Hunter's. Each strip was divided into three at harvest, giving up to eighteen comparisons with the standard.

The unusually wet season caused extreme caking of the surface of the ground, and this crop, like many autumn- and winter-sown ones in the same period, suffered very badly, as will be seen from the extremely poor yields. So bad was the effect of the wet that portion of one end of the plots had to be eliminated from the yield-determination.



PORTION OF WHEAT VARIETY PLOTS, ASHBURTON EXPERIMENTAL FARM, SEASON 1925–26. [*Photo by F. E. Ward.*

As in the previous year, all varieties were sown at a rate calculated to give the same number of seeds per acre as 90 lb. of College Hunter's. To arrive at the required quantity of seed for each variety a number of 100-grain samples were weighed and the mean calculated; hence the number of grains per unit weight was arrived at.

Table 1.—Yield of Wheat Varieties, 1926 Harvest.

Area of individual plot = $\frac{1}{68}$ acre. > = greater than (all tables).

Variety.	Number of Paired Plots compared.	Yields per Acre. Variety.	College Hunter's.	Difference (+) in favour of College Hunter's or (−) of Variety.	Odds.	Date sown in June.*	Date harvested.
		Bushels.	Bushels.	Bushels.			
Velvet (Ngapara)	14	13·9	12·7	−1·2	210	26th	8/2/26
Velvet (College) ..	13	14·1	13·5	−0·6	N.S.†	25th	8/2/26
Essex Conqueror..	17	13·9	14·0	+0·1	N.S.	25th	9/2/26
Goldberry ..	17	13·0	13·5	+0·5	N.S.	27th	16/2/26
Solid-straw Tuscan	12	13·6	14·7	+1·1	N.S.	24th	9/2/26
Red Fife ..	16	12·1	13·8	+1·7	180	26th	26/1/26
White-straw Tuscan	15	11·4	13·7	+2·3	950	26th	29/1/26
Yeoman ..	17	11·3	14·3	+3·0	850	26th	16/2/26
Marquis ..	15	12·0	15·2	+3·2	>9999	25th	26/1/26
Zealand.. ..	16	10·0	14·6	+4·6	>9999	27th	29/1/26
Major	16	9·5	14·4	+4·9	>9999	26th	26/1/26
Queen Fan ..	17	8·7	14·6	+5·9	>9999	25th	26/1/26
Queen Fair ..	15	7·7	14·6	+6·9	>9999	25th	26/1/26

* College Hunter's sown 23rd June. † Where the letters "N.S." are inserted in this and other tables the difference is non-significant—that is, the chances are less than 30 to 1 in its favour.

A comparison with the results of the preceding season will show that several varieties which proved superior in the 1925 harvest yielded very poorly under the adverse conditions met with in that of 1926. While several varieties have held their own with College Hunter's, only Velvet (Ngapara) has proved superior by a small amount.

WHEAT MANURIAL TRIAL.

An experiment on the manuring of wheat was conducted with the following treatments. The paddock had previously been in grass for four or five years.

	Per Acre.
(1.) Control (no manure)	..
(2.) Superphosphate (42/44 per cent.), 104 lb.; and sulphate of ammonia (20 per cent. nitrogen), 82 lb.	186 lb.
(3.) Ammo-Phos (20/20)*	100 lb.
(4.) Super	104 lb.
(5.) Super, 250 lb.; and sulphate of potash (48 per cent. K_2O), 56 lb.	306 lb.
(6.) Super	250 lb.
(7.) Ammo-Phos (13/48)*	100 lb.
(8.) Super, 250 lb.; and sulphate of ammonia, 53 lb. ..	303 lb.
(9.) Super, 250 lb.; sulphate of potash, 56 lb.; and sulphate of ammonia, 53 lb.	359 lb.

* Ammo-Phos is in two grades: that described as 20/20 contains 20 per cent. ammonia (= 16·4 per cent. nitrogen) and 20 per cent. phosphoric anhydride; the 13/48 grade contains 13 per cent. ammonia (= 10·7 per cent. nitrogen) and 48 per cent. phosphoric anhydride.

Fourteen replications of these treatments were sown, each plot being divided into two at harvest-time. Thus, up to twenty-eight paired comparisons were made.

The variety used was Solid-straw Tuscan; seeding, 1¾ bushels per acre; date sown, 22nd September, 1925; harvested, 17th February, 1926.

The paddock had been in wheat in the 1924-25 season, and prior to this in grass for four or five years.

Objects of applying Manures as shown.

(1.) Each grade of Ammo-Phos is immediately alongside a mixture of super and sulphate of ammonia containing an equal amount of nitrogen and phosphate. Hence a comparison of each grade of Ammo-Phos was made with standard fertilizers. Plots 3 are compared with Plots 2, and Plots 7 with Plots 8.

(2.) Super alone was sown in quantities equal to those in mixtures 2 and 8 above. Hence Plots 4 are compared with Plots 2, and Plots 6 with Plots 8. This allows a determination of the effect of the sulphate of ammonia as an addition to the phosphate.

(3.) A comparison of the smaller quantity of super with the larger was expected to give some idea of whether an increased amount of super would be profitable in use. Hence Plots 4 are compared with Plots 6.

(4.) An amount of ½ cwt. of sulphate of potash was added to straight super and to a mixture of super and sulphate of ammonia to determine whether its use was profitable. Plots 4 are compared with Plots 5, and Plots 8 with Plots 9.

(5.) All plots are compared with the control.

The results are shown in Table 2.

Comments on Table 2.

(1.) All treatments *other than* straight-out super have given significant increases over control, although the direct comparisons are not shown here. That these increases are due to the nitrogen is evident from the following.

(2.) Neither quantity of super has had any effect on the yield. This result is extraordinary, as the land on which the trial was conducted generally shows a marked response to phosphatic manuring.

(3.) The addition of sulphate of ammonia at the rate of 82 lb. and 53 lb. per acre has caused increases of 5·3 bushels and 4·9 bushels per acre respectively. Sulphate of ammonia costs 22s. per hundredweight, so that 82 lb. and 53 lb. costs 16s. and 10s. 6d. respectively. The effect of nitrogen in increasing the yield *may* be as anomalous as the lack of response from phosphates. The winter was extremely wet, and excessive leaching of nitrates must have resulted.

(4.) Both mixtures of super and sulphate of ammonia give decided increases over the Ammo-Phos with which they are compared.

(5.) Sulphate of potash at ½ cwt. per acre, as an addition in one case to super and in the other to super and sulphate of ammonia, shows no significant benefit.

Table 2.—Results of Wheat Manurial Experiment, 1926 Harvest.

Area of individual plot = $\frac{1}{118}$ acre.

Comparison A *versus* B.	Number of Paired Plots compared.	Yield per Acre.	Difference in Favour of A.	Odds.
		Bushels.	Bushels.	
A. Super, 104 lb. per acre ..	26	46·3	0·2	N.S.
B. Control	..	46·1	..	..
A. Super, 104 lb.	26	46·3	0·2	N.S.
B. Super, 250 lb.	..	46·1	..	..
A. Super, 104 lb., plus sulphate of ammonia, 82 lb.	24	51·6	5·3	>9999
B. Super, 104 lb.	..	46·3	..	..
A. Super, 250 lb., plus sulphate of ammonia, 53 lb.	14	51·3	4·9	>9999
B. Super, 250 lb.	..	46·4	..	..
A. Super, 104 lb., plus sulphate of ammonia, 82 lb.	24	51·6	0·8	33
B. Ammo-Phos (20/20), 100 lb. ..	..	50·8	..	..
A. Super, 250 lb., plus sulphate of ammonia, 53 lb.	14	51·3	1·7	1400
B. Ammo-Phos (13/48), 100 lb. ..	..	49·6	..	..
A. Super, 250 lb., plus sulphate of potash, 56 lb.	26	46·3	0·2	N.S.
B. Super, 250 lb.	..	46·1	..	..
A. Super, 250 lb., plus sulphate of ammonia, 53 lb., plus sulphate of potash, 56 lb.	14	52·0	0·7	N.S.
B. Super, 250 lb., plus sulphate of ammonia, 53 lb.	..	51·3	..	..

OAT MANURIAL TRIAL.

With the idea of comparing the effect of superphosphate with a proprietary grain-manure, two experiments in manuring of oats were conducted on the same paddock as that used for the wheat manurial trial. The experiments are referred to as A and B.

Experiment A.

Variety, Garton's; seeding, 90 lb. per acre; date sown, 24th September, 1925; date harvested, 28th January, 1926. The treatments used and the order in which they were sown are as follows:—

	Cwt. per Acre.		Cwt. per Acre.
(1.) Control (no manure).		(5.) Proprietary grain-manure	2
(2.) Proprietary grain-manure	1	(6.) Super	1
(3.) Superphosphate (42/44) ..	1	(7.) Proprietary grain-manure	1
(4.) Super	2		

NOTE.—Minimum percentages of manurial constituents in proprietary grain-manure were: Tricalcic phosphate, 30·35 per cent.; nitrogen (insoluble in water), 1·25 per cent.; potash (equivalent of sulphate potash), 2·0 per cent.

Eighteen replications of the above series were sown, and the plots divided into two at harvest. Total weights were taken just before

threshing, so that evaluation of increases of total weight or grain weight can be made. The results are shown in Table 3.

Table 3.—Oats Manurial Trial, Harvest 1926.

Area of individual plot = $\frac{1}{137}$ acre.

Comparison A *versus* B.	Number of Paired Plots compared.	Total Produce per Acre.		Odds.	Number of Paired Plots compared.	Grain per Acre.		Odds.
		Yield.	Difference in Favour of A.			Yield.	Difference in Favour of A.	
		Cwt.	Cwt.			Bushels.	Bushels.	
A. Super, 1 cwt. ..	50	43·8	1·8	266	50	35·6	0·8	N.S.
B. Control ..	..	42·0	..	..	..	34·8	..	..
A. Super, 2 cwt. ..	24	45·5	3·6	1350	23	38·3	3·2	> 24000
B. Control ..	..	41·9	..	..	..	35·1	..	..
A. Proprietary grain-manure, 1 cwt.	50	43·7	1·7	> 24000	47	35·4	0·5	N.S.
B. Control ..	..	42·0	..	..	..	34·9	..	..
A. Proprietary grain-manure, 2 cwt.	26	46·2	4·0	1350	24	37·2	3·1	16665
B. Control ..	..	42·2	..	..	..	34·1	..	..
A. Super, 2 cwt. ..	36	45·6	1·7	> 24000	35	38·6	2·0	> 24000
B. Super, 1 cwt. ..	..	43·9	..	..	..	36·6	..	..
A. Proprietary grain-manure, 2 cwt.	36	45·9	2·7	3124	34	37·6	3·1	> 24000
B. Proprietary grain-manure, 1 cwt.	..	43·2	..	..	..	34·5	..	..
A. Super, 1 cwt. ..	72	43·8	0·2	N.S.	69	36·1	0·4	N.S.
B. Proprietary grain-manure, 1 cwt.	..	43·6	..	..	..	35·7	..	..
A. Proprietary grain-manure, 2 cwt.	36	45·9	0·3	N.S.	33	37·8	..	..
B. Super, 2 cwt. ..	..	45·6	..	..	..	37·8	..	..

Comments on Table 3.

All manures have caused small but highly significant increases in total produce over controls. The small increases of 0·8 and 0·5 bushel of grain per acre due to 1 cwt. of super and 1 cwt. proprietary grain-manure respectively are shown as non-significant. In view of the certainty attained in the total-produce increases due to these manures it is probable that the grain-weight increases are also real. The 2 cwt. quantities of both manures show decided increases over the corresponding 1 cwt. quantities.

Allowing £3 10s. per ton as the value of sheaves in stack, or 3s. 6d. per bushel as the value of the oats after deducting threshing and haulage costs, none of the increases of control is profitable. In each case the increase is barely sufficient to pay for the cost of the manure used.

The differences between the yields from corresponding quantities of super and grain-manure are not significant.

Experiment B.

In this experiment the same manures were used, but were compared on a phosphate-content basis. Variety, Garton's; seeding, 90 lb. per acre; date sown, 25th September, 1925; date harvested, 27th January, 1926.

The objects of the experiment were (1) to compare applications of 1 cwt. and 2 cwt. of super with quantities of a proprietary grain-manure containing an equivalent amount of phosphate; (2) to determine whether the small amounts of nitrogen and potash included in the proprietary grain-manure were of any measurable benefit.

Hence the manures were applied as follows: (1) Super, 1 cwt. per acre; (2) proprietary grain-manure, 155 lbs.; (3) super, 2 cwt.; (4) proprietary grain-manure, 310 lbs. The larger quantity of grain-manure did not run at the desired rate, and was not taken into account when the measurement of results was made. Forty-three replications of each treatment were applied, and each harvested plot was $\frac{1}{102}$ acre.

The results were as follows:—

	Total Weight per Acre. Cwt.	Grain Weight per Acre. Bushels.
Super, 1 cwt.	38·4	32·5
Proprietary grain-manure, 155 lb.	38·0	32·6
Super, 2 cwt.	38·7	33·2

Super at 1 cwt. has been compared with the proprietary grain-manure at 155 lb., and super 1 cwt. with super 2 cwt. Neither comparison shows any significant difference.

General Conclusions.

The use of manures as shown by Experiment A, although causing an increase in yield, has not been profitable.

The fact that the greater quantities of manure used in Experiment A gave significant increases in yield over the smaller quantities points to the slight difference between the 1 cwt. and 2 cwt. quantities of super in Experiment B being a real one, although it cannot definitely be regarded as such. The soil on which Experiment B was conducted was lighter than that used for Experiment A.

The proprietary grain-manure, which cost £7 10s. per ton, has not in these experiments proved superior to superphosphate costing £7 per ton.

The extremely small responses make measurement of differences difficult. With greater effect from manures, as in a more typical season, the differences between manures may be accentuated. The trial is being repeated in the present season.

Effect of Light Seeding.

As an indication of the effect of too light seeding the following is worth recording: In sowing Experiment A an error in the seed-adjustment of the drill was made, with the result that the first six control plots were seeded at the rate of 62 lb. per acre. Naturally these were eliminated from the comparisons already made. A direct comparison between these plots and those receiving 1 cwt. of super

and the normal seeding of 90 lb. per acre shows a difference of 5·3 cwt. of total produce and 5 bushels of grain in favour of the super plots. Where the controls receiving the same amount of seed as the super are compared with the super, the difference is 1·8 cwt. of total produce and 0·8 bushels of grain in favour of super (see Table 3). Hence it seems reasonable to conclude that a seeding of 60 lb. per acre is far too light.

TURNIP VARIETY TRIAL.

A trial of the following varieties was conducted: (1) Lincolnshire Red; (2) Wiboltt's White (flat, green-head) Norwegian May; (3) Funish Bortfelder Long Yellow Improved; (4) Imperial Green Globe; (5) Yellow Tankard Green-top; (6) Ostersundum Medicum (long, red-head, white flesh); (7) Mailand Early Flat Purple-top.

The commonly grown varieties Nos. 1 and 4 were used as the the standards for comparison, and as they did not differ from one another in yield each of the other varieties is compared with the one to which it was nearer.

Eighteen replications of the above series were sown on the flat, each plot being two rows in width, and the rows 24 in. apart. Seeding was at the rate of 6 oz. per acre, the plants being thinned to uniform distance apart.

Super at 1 cwt. per acre was applied. This was sown, part in the seed-rows and part down coulters 6 in. on each side of the seed-rows.

Sowing was done on 28th December, 1925. The germination was good throughout, except in the case of Variety 2 above (Wiboltt's). This variety was almost a complete failure, yielding only 3 tons per acre. The laboratory germination showed a 60-per-cent. germination in four days against from 81 per cent. to 100 per cent. with the other varieties.

Table 4.—Yield of Turnip Varieties, Season 1926.

Area of individual plot = $\frac{1}{808}$ acre.

Comparison A *versus* B.	Number of Paired Plots compared.	Total Weights per Acre.		Odds.
		Yield.	Difference in Favour of A.	
		Tons.	Tons.	
A. Var. 4, Imperial Green Globe ..	41	34·3	0·2	N.S.
B. Var. 1, Lincolnshire Red ..	..	34·1	..	..
A. Var. 4, Imperial Green Globe ..	42	34·0	4·2	>24000
B. Var. 3, Funish Bortfelder ..	..	29·8	..	..
A. Var. 4, Imperial Green Globe ..	41	34·1	14·5	>24000
B. Var. 5, Yellow Tankard Green-top	..	19·6	..	..
A. Var. 4, Imperial Green Globe ..	42	34·0	9·2	>24000
B. Var. 6, Ostersundum	..	24·8	..	..
A. Var. 1, Lincolnshire Red ..	39	33·4	13·8	>24000
B. Var. 7, Mailand	..	19·6	..	..

At the time of weighing—17th June, 1926—all varieties were sound, and the growth of tops was greatest on the standard varieties Nos. 1 and 4. Varieties 2 and 7 had lost their tops completely, while the tops on Nos. 3, 4, and 5 were dying off. The tops of No. 6 were almost gone. During June, July, and August the plots were fed off, and Mr. McKay reported that although the Imperial Green Globes were the soundest the sheep showed no preference for any particular variety. The total weights of tops and roots are shown in Table 4.

Comments on Table 4.

Imperial Green Globe and Lincolnshire Red have given equal yields. The only variety which has approached either of these in yielding-capacity is Funish Bortfelder Long Yellow Improved.

In order to get an approximate measure of the proportion of root and top to total yield a smaller number of weighings were made of the roots and tops separately in the case of Varieties 1, 3, 4, 5, and 6. The "roots" expressed as percentage of the total weights are as follows :—

Variety.	Per Cent.	Number of Determinations.
1	85·5	14
3	94·4	14
4	92·9	13
5	94·9	13
6	97·1	14

In "Rations for Live-stock," by Professor T. B. Wood, the feeding-value of tops is given as approximately one-fifth greater than that of the "roots." This value of tops must necessarily depend upon the time at which they are fed off, and it is assumed that the total produce as shown in Table 4 gives a fair measure of the relative values of the varieties. Generally speaking, in Canterbury tops have succumbed to the attacks of aphis and diamond-backed moth before feeding is done in winter.

LIMING AND PHOSPHATE TOP-DRESSING OF LUCERNE.

In last year's report on the farm operations a short account of the result of top-dressing of lucerne is given. The treated plots, which were duplicated, were again weighed in the first crop of 1925–26. No additional treatment had been applied. At the time of cutting the control plots were conspicuous by their lightness in colour and slightly poorer growth as compared with the treated ones. Twelve weighings from each treatment were made on 9th November, 1925. The hay weight proved to be 26·9 per cent. of the green weight. The results were as follows :—

	Yield of Hay, Tons per Acre.	Increase over Control, Tons per Acre.
Control	2·19	..
Super, 2 cwt.	2·56	0·37
Lime, 840 lb.	2·52	0·33
Lime, 420 lb., plus super, 2 cwt...	2·67	0·48

All increases are highly significant, and, in addition to those recorded in last year's report, can leave no doubt as to the benefit that has been derived from all applications, the recorded yields from which are from only one crop in each season.

GREEN MANURIAL TRIAL.

Last year's report briefly described the commencement of a green manurial trial in which plots having rape fed off and bare fallow are included. The whole area was sown in Garton oats at 2 bushels per acre, with 1 cwt. super, in September, 1925. The plots were harvested early in February. Mr. McKay reports that the whole area was worked up with grubber and harrows in the early spring prior to sowing. The wet spring affected tillering, and the crop was light. Differences in growth were sufficiently marked in the early stages to be quite noticeable, the plots having rape and those with oats and vetches ploughed in showing the greatest amount of growth. Some of the plots, particularly those which were bare-fallowed, had a considerable amount of fat-hen weed present.

As mentioned in last year's report, there were three replications of each treatment. Each plot was 21 ft. in width. In sowing the oat crop the two drill-widths falling nearest the middle of each plot were defined by a 14 in. space on each side. These strips were harvested in six lengths, giving eighteen individual plots in each treatment. Owing to the incidence of fat-hen on some of the plots grain weights only are recorded.

Table 5 gives full details of treatments and yields of the oat crop.

Table 5.—Green Manurial Trial.

Area of individual plot = $\frac{1}{88}$ acre.

Treatment.	Seeding per Acre.	Date sown.	Date ploughed in or fed off.	Approximate Weight of Green Material per Acre.	Yield of Oates per Acre in 1926 Harvest.
Section 1: Yields not differing from one another to significant degree, but all significantly superior to those in Section 2.					
				Tons.	Bushels.
Rape (ploughed in)	2½ lb.	24/11/24	31/1/25	7·3	30·3
Oats and vetches ..	1 bushel and 2 bushels	6/9/24	8/12/24	6·3	32·4
Crimson clover ..	8 lb.	6/9/24	9/12/24	Not weighed —mostly fat-hen.	27·7
Rape (fed off)* ..	2½ lb.	24/11/24	20/1/25	..	29·7
Section 2: Yields not differing from one another to significant degree.					
Mustard ..	10 lb.	4/9/24	13/11/24	3·7	18·3
Cape barley ..	2 bushels	4/9/24	13/11/24	3·0	20·5
Bare fallow ..	..	..	..	..	18·4

* Rape lots fed off were sown after blue lupins which failed. As all lots had 1 cwt. of super applied at time of sowing, these plots received a double application.

Comments on Table 5.

Those plots shown in Section 1 have proved quite superior to those in Section 2, and with the exception of the crimson-clover plots have the highest amount of green material. The fed-off rape plots were about equal to the ploughed-in ones. As previously mentioned, the crimson-clover plots had a large amount of fat-hen.

The bare-fallow plots were handicapped by the incidence of fat-hen in the subsequent oat crop, and no doubt the extremely wet winter caused a large amount of leaching and probably greater compaction of the soil where newly-turned-in organic matter was absent.

The effect of green manure is not likely to be sufficiently great to give a sufficient increase in one season to compensate for the cost of growing a crop for the express purpose of ploughing in. Consequently the effect, which is likely to extend over a period of time, must be followed up, otherwise a true measure of its economic value cannot be obtained. It is intended to weigh crops on these plots for a number of seasons.

BOYS' AND GIRLS' AGRICULTURAL CLUBS.

TARANAKI AND WANGANUI DISTRICTS COMPETITIONS, 1925–26.

A. J. Glasson, Fields Instructor, Hawera.

In the past season these competitions were again carried out in the North and South Taranaki and Wanganui districts on similar lines to those of previous years. Mangold and carrot crops were grown in all three districts; in Taranaki calf clubs were also run. The interest in the competitions continues to increase, and the results obtained are gratifying.

ROOT-GROWING.

The season on the whole was not very satisfactory, some plots being either wholly or partly spoilt by a dry spell at sowing-time unduly retarding germination. This was followed by a wet January that made cultivation difficult at a time when it would have been of most benefit to the crops. Some of the districts also experienced a fairly dry autumn that was not conducive to heavy crops generally; it was noticeable that most of the heavy crops were grown in rather damp situations. The standard of cultivation and general care of the plots showed an improvement on previous years.

The mangold variety grown was Cross and Sons' Giant Orange Globe, which proved to be satisfactory, only a few cases of roots not true to type being found. The carrot variety was Sutton's Matchless White, which was rather inclined to premature seeding, but otherwise satisfactory.

Seed was supplied for 506 plots, as compared with 429 plots for the preceding season; 313 plots, or 60·8 per cent. of the entries, completed, as compared with 66·4 per cent. for the previous year. This falling-off in the number of the plots judged as compared with the seed supplied was partly due to the poor germination of a number of the crops, the reason for which has already been mentioned. This was particularly noticeable in North Taranaki, where only 54 per cent. of the crops for which seeds were supplied were finally judged. Plots destroyed by stock were not so numerous as previously, but

there is still room for improvement in this direction. Some parents also pulled their children's plots before judging-day because they happened to be pulling their own. If those parents who do this sort of thing, and also do not take sufficient care to keep stock from gaining admission to the plots, were to take a little more interest in the work, then the percentage of completions would be a good deal higher. However, it is pleasing to note that supervisors, teachers, and the majority of parents take a very keen interest in the welfare of the clubs.

The average weight per acre of the 184 mangold crops judged was 50 tons 12 cwt., compared with 47 tons 11 cwt. the previous year and 56 tons 14 cwt. for the 1923–24 season. The dry spell during the autumn did not have the same effect on the deeper-rooting carrots, and 149 crops averaged 40 tons 5 cwt. per acre, against 35 tons 12 cwt. for the preceding season. The average yields per acre for the various districts were: Mangolds—North Taranaki, 52 crops, 48 tons 10 cwt.; South Taranaki, 58 crops, 56 tons 14 cwt.; Wanganui, 74 crops, 47 tons 7 cwt. Carrots—North Taranaki, 41 crops, 29 tons 14 cwt.; South Taranaki, 57 crops, 43 tons 17 cwt.; Wanganui, 31 crops, 47 tons 14 cwt.

The heaviest mangold crop—116 tons 17 cwt. per acre—was grown by Gordon Martin, Upokongaro School (near Wanganui); the heaviest crop in 1924–25 was 101 tons 7 cwt., grown by Clarence Morrison, Turakina. The heaviest carrot crop was grown by Ray Wallis, Okaiawa School, who had a record crop for the competitions of 76 tons 13 cwt. per acre; the best crop in the preceding season was 66 tons 13 cwt., grown by R. Calvert, Hillsborough.

The placings for the championships were as follows, the places named referring to schools in each case:—

Mangolds.—North Taranaki: Vall Penwarden, Tataraimaka, 104 tons 11 cwt. per acre, 197½ points, first; G. Penwarden, Tataraimaka, 98 tons, 193 points, second; Teresa Fabish, Tataraimaka, 83 tons 1 cwt., 179 points, third.

South Taranaki: Harry Willis, Matapu, 100 tons 8 cwt., 194½ points, first; Lloyd Walker, Oeo, 95 tons 12 cwt., 185½ points, second; Bertha Widmer, Mokoia, 95 tons 12 cwt., 184½ points, third.

Wanganui: Gordon Martin, Upokongaro, 116 tons 17 cwt., 205¾ points, first; Clarence Morrison, Turakina, 108 tons 6 cwt., 205¼ points, second; Dave McDonald, Alton, 113 tons 3 cwt., 203 points, third.

Carrots.—North Taranaki: Cliff Tyrrell, Rahotu, 67 tons 7 cwt., 154¼ points, first; Jeff Longstaff, Huirangi, 58 tons, 148 points, second; Alex. Hamil, Rahotu, 44 tons 13 cwt., 140½ points, third.

South Taranaki: Ray Wallis, Okaiawa, 76 tons 13 cwt., 162½ points, first; Stanley Coleman, Te Roti, 71 tons, 160 points, second; Una Glynn, Ohangai, 57 tons 6 cwt., 157¼ points, third.

Wanganui: Sybil Lethbridge, Waitotara, 66 tons 7 cwt., 156¼ points, first; John Middleton, Waverley, 63 tons 19 cwt., 154¾ points, second; Dorothy Dunlop, Fordell, 57 tons 4 cwt., and Janet Train, Waitotara, 57 tons 1 cwt., both 150 points, third.

As usual, exhibits from the clubs were staged at the Hawera, New Plymouth, and Wanganui winter shows, and were very favourably

commented upon. In the competitive classes at all three shows there was an increase in the number of entries, and the quality was quite as good as that in the open classes.

CALF-REARING.

North Taranaki.

The entries were slightly in advance of those for the 1924–25 season, and 54 calves were judged. Competition was very keen, and the condition and quality of the calves generally better than in any previous year. Record charts were also well done, some being very fine, and the remainder slightly better than in previous years. The championship placings were as follows:—

Jersey or Ayrshire: A. J. Paterson, Kaimiro, 140 points, first; Elsie Moffitt, Warea, 139 points, second.

Friesian or Shorthorn: L. Lambert, Bell Block, 137 points, first; D. Goble, Durham, 133 points, second.

South Taranaki.

Here the entries showed a large increase, and 155 calves were judged, compared with 96 last year. Again the condition and quality of the calves and the record charts showed an improvement on previous years. The 155 calves judged represented the following breeds: Jersey, 131; Friesian, 17; Shorthorn, 6; Ayrshire, 1. All the calves were grade heifers, and the numbers give some idea of the popularity of the Jersey breed in this district. Following were the placings in the championship judging:—

Jersey-Ayrshire: N. Walker, Okaiawa, 142 points, first; G. Anderson, Toko, 140 points, second; W. Dakers and C. Rothery, Manaia, and E. Bennett, Normanby, all 138 points, third.

Shorthorn-Friesian: M. Major, Rawhitiroa, 140 points, first; E. Major, Rawhitiroa, 138 points, second; M. Jones, Finnerty Road, 136 points, third.

Prizes were also given for dairy type, and these were won as follows: Jersey-Ayrshire class, I. Kirk, Auroa; Friesian-Shorthorn class, C. Betts, Okaiawa.

Judging was carried out on the lines of 50 points for record and 100 points for the condition of the calf. Points for the cost of food fed to the calf are no longer given, as it is found that these are very unsatisfactory. Information as to the class of food, amount, and cost must still be entered on the record charts, and these show a very wide range—from 2s. 1⅓d. to £3 19s. per calf. Since the rule as to no points for cost of food was introduced in 1924 the average cost of food has shown a fairly marked increase as follows: 1922, 16s. 6d.; 1923, 16s. 2¼d.; 1924, 18s. 1½d.; 1925, 24s. 3d. However, as the condition and quality of the calves generally show an improvement, this may be an advantage rather than a disadvantage, provided that too high a cost is not obtained so as to make the rearing an unprofitable undertaking.

Registered Apiaries.—The total number of apiaries in the Dominion at 31st March last was approximately 7,100, representing nearly 100,000 colonies of bees.

TOP-DRESSING OF KING-COUNTRY HILL LANDS.

A SURVEY OF ITS VARIOUS ASPECTS.

J. E. F. Jenks, N.D.A., Instructor in Agriculture, Te Kuiti.

It is now beyond question that one of the main causes of the "deterioration" of so much of the North Island hill country is the fact that its natural fertility has been severely depleted by the production and sale of young stock. There are, for instance, many cases in which land has been "held," and even "brought back," without top-dressing, simply by means of substituting mature cattle and sheep for breeding-ewes. It is, of course, open to question whether this expedient could check deterioration indefinitely, but its success provides further proof, if it were needed, that the supply of available phosphates and lime in these soils is one of the limiting factors. For many years to come the production of lamb will be the best source of revenue on these hill lands, and lambs cannot be bred and reared successfully unless the removal of phosphates and lime is counterbalanced by suitable and adequate manuring. There is little doubt that had top-dressing been commenced eight or ten years ago, when the land was still in comparatively good order, there would be very much less deterioration to-day.

Seeing that King-country settlers commenced manuring their hill lands only some four or five years ago, and that it is only during the past two years that the practice has become at all general, present experience, though fairly wide in scope, does not cover any lengthy period of time. For example, the residual effect of manure is still largely a matter of conjecture. However, there is at the present time a large number of experiments in hand, and these should considerably enlarge our knowledge. In addition to various small-scale trials for comparing the different manures and mixtures, there are now in progress experiments on a larger scale designed to gain information on the following points:—

(1.) The comparative response of the different classes of land to fertilizers.

(2.) The approximate length of time required before the fertilizer takes effect.

(3.) The labour costs of applying the fertilizer, &c.

(4.) The return that can reasonably be expected under different conditions.

(5.) The residual effect of fertilizers.

The principal line of action at the present time is to take a comparatively large block of land, and to obtain the desired data by record and observation extending over a period of years.

THE ECONOMIC ASPECT.

Probably the most influential factors here are the quality of the soil and, to a less extent, the age of the pasture and the type of management followed. Generally speaking, the poorer the land and the older the pasture the slower will be the response and the more doubtful the financial returns. It is difficult to find an instance in

which manuring has *not* brought about an improvement both in pasture and stock; but on certain types of land, more especially broken country of low natural fertility, it is doubtful whether as yet this improvement is sufficient to meet the bill for fertilizer, freight, cartage, and labour. A financially embarrassed settler can scarcely be blamed for asking, "Does it pay?"

He can very largely be reassured if he will realize the fact that there are at least six different ways in which expenditure on top-dressing is repaid:—

(1.) Increased cash income, due to the larger number of stock carried and their increased health and productivity.

(2.) Reconversion of store country to breeding country.

(3.) Lower mortality of stock.

(4.) Enhanced value of the pasture itself. Capital expenditure on grassland, fencing, &c., is increased in value; in some cases top-dressing saves this capital from complete obliteration.

(5.) Lower maintenance expenses—for example, cattle for crushing &c., and scrub-cutting.

(6.) Benefit to the holding as a whole by the conversion of part of it into a recuperative and fattening area.

The influence of the quality of the land itself is in many cases very striking. Not only does the better-quality land respond more rapidly to top-dressing, but the naturally greater productivity of the stock on such land increases the profit derived from the operation.

To quote instances: A settler near Te Kuiti has obtained in one particular paddock of easy papa country an increase in carrying-capacity of a ewe per acre after a single application of 2 cwt. of fertilizer per acre. As his lambs are sold fat off their mothers, and his ewes average 9 lb. per fleece, he can estimate his immediate return at £1 10s. per acre, and he still has the residual effect of the fertilizer.

Again, a holding at Matiere includes a steep face divided into three paddocks. This face was originally in tawhero and manuka, and that the pasture has been hard to hold is evidenced by the fact that the occupier has had to do a considerable amount of crushing and burning during the last two years However, the underlying formation is good heavy papa, and last season it carried rather more than a ewe per acre. The first paddock of 40 acres was top-dressed late in July with 2 cwt. of basic super per acre; it has since been carrying 120 ewes. The second paddock of 25 acres had 2 cwt. of superphosphate per acre in August; it is now carrying sixty-five ewes. In both paddocks the sheep are in thriving condition and the feed is gaining on them. The third paddock of 40 acres, left unmanured, is with difficulty carrying fifty ewes. It is interesting to note that the response to the fertilizer was almost immediate, and that the feed on the top-dressed portion of the face is now immensely superior to that on the easy country above and below it. This striking result can be attributed partly to good stock-management, but more to the fundamental fertility of the underlying formation.

At the other end of the scale we have the type of land that is at present incapable of carrying more than a small stocking of dry sheep and cattle. Experience gained to date seems to indicate that the most that can be expected in such cases from two applications of 2 cwt. each is an increase of 100 per cent.—say, from 75 to 150 sheep per 100

acres; under favourable circumstances the land may be reconverted from wether country to ewe country. However, at a sanguine estimate the increase may be put at 10s. per acre over a period approximately equivalent to four years, a total of £2 per acre. As the cost of the dressing varies from 15s. to £1 per acre, it will be seen that the actual cash profit on the transaction is, at present prices, doubtful, though, for the reasons previously given, the benefit to the holding as a whole may be considerable.

In regard to land that is in an intermediate stage of reversion, it can be safely said that, where bracken fern is dominant, manuring combined with suitable subdivision and cattle-crushing is, in the great majority of cases, a better and cheaper method of reclamation than burning and resowing. Provided that the land was originally sown with an adequate grass-mixture and has not been overgrown for too long a period, the ground will be found to have retained enough seed and attenuated plants of grass and clover to form once more a good turf when the covering of fern has been opened up by the cattle and their good work followed up with the application of a suitable fertilizer. Where resowing is carried out, top-dressing and good stock-control are still needed to save the young pasture from domination by the young and reinvigorated fern.

CHANGES IN PASTURE-COMPOSITION DUE TO TOP-DRESSING.

On this subject it is rather dangerous to be dogmatic, because so much depends upon the nature of the land, the existing sward, and the type of management followed. Some land, by reason of its steepness or other natural disability, is unfitted to carry more than a moderate sprinkling of the better species. In such cases top-dressing will invigorate and improve the "hard" grasses and minor legumes that are the natural covering for that class of land, but it is useless to expect the fertilizer to restore the full mixture of English grasses with which the land was originally sown. Again, heavy continuous grazing with sheep will largely nullify the effect of top-dressing by denying the herbage plants a chance to avail themselves fully of the fertilizer. Top-dressing must be intelligently followed up.

Generally speaking, the first symptom of improvement after top-dressing is a steady increase in the minor legumes, such as suckling-clover and the lotus species; these tend to take charge of the bare patches and to replace the smaller weeds. At the same time the grasses will show an increased vigour, more especially if spelling is intelligently carried out. The stock show greater vitality, and can be induced to clean up fern and piripiri (hutiwai) with much less harm to themselves. The herbage plants, Lotus major in particular, are encouraged to push through existing patches of moss and piripiri. Later, and particularly if cattle are the dominant grazing-animals, cocksfoot and Poa pratensis are greatly stimulated and tend to take the ground occupied by the poorer grasses. Later still rye-grass may reappear, and white clover will tend to replace the minor legumes. The herbage will start growth earlier in the spring, will be less affected by dry weather, and will continue growth later in the autumn. Fern, piripiri, hawkweed, and even seedling manuka and gorse will tend to disappear by reason of the increased hoof cultivation and the greater palatability of the herbage.

MANURES AND METHODS.

Choice of manure now presents no serious problems. The great point is to obtain as much quick-acting phosphate as possible per pound spent. On the heavier and moister classes of land, slag is undoubtedly the most suitable, its only drawback is its mechanical texture, which renders even distribution difficult and laborious. Some settlers overcome this difficuly by mixing super and slag in the paddock, and it is possible that the super and Nauru mixture may prove an efficient substitute. On all classes of land super appears to work well, though it is supposed, not unreasonably, that an admixture of lime with it gives feed of better quality. On soils of volcanic origin it is certainly desirable to use a small proporation of lime in order to get the best results from the super. It is, however, extremely doubtful whether large dressings of lime are profitable, at any rate where the cost of cartage and distribution is high. The value of potash is still in doubt, though this season's work may yield more definite results.

The question of quantity of fertilizer per acre, from an economic point of view, is still in doubt, and should be the subject of further trials. At present the limited finances of the settlers tend to make the probable effective minimum of 2 cwt. per acre the standard dressing. Finance permitting, it may well be that a dressing of up to 6 cwt. per acre is justified in some cases, both by its immediate effectiveness and by saving the labour of annual dressings. It is, at any rate, fairly certain that where a second dressing is obviously required it is better to do this than to push out on to fresh areas. It is, too, a sound plan for the man of limited means to concentrate on his cleanest paddocks first. He can then use the revenue he has derived from their increased productivity to extend his manuring further afield.

Another thing worth trying is the top-dressing of the harder portions of paddocks that comprise both easy and difficult land. The latter is not only in itself low in fertility, but always tends to revert to fern by reason of the fact that stock are apt to neglect it. Stock will always follow the manure-bag.

Settlers are rapidly adapting themselves to this new piece of farm routine. A little experience can save much time and labour. One settler who manures several hundred acres annually has constructed at his wool-shed a special platform for the more expeditious loading of packhorses. Generally speaking, the cost of labour for dressing varies from 1s. 6d. to 3s. per acre, and packing or sledging 6d. to 1s. 6d. according to the distance. Fertilizer manufacturers or merchants might well make a regular practice of sending out manure in stout 100 lb. bags suitable for horse-packing.

Underplanting in Native Forests.—The Conservator of Forests for the Rotorua Region states that Lawson's cypress continues to show the best results for this purpose, and generally has made excellent growth. Other species, while making fair to good growth in open spaces, are poor or entirely suppressed where the undergrowth is heavy or the shade dense. Success in underplanting indigenous forests with exotic trees, he adds, depends principally upon the selection of certain tolerant species and periodical clearing of the undergrowth.

CALIFORNIAN-THISTLE HEADS IN FEED OATS.

THERE has been received recently from a farmer in the north of Auckland a sample of feed oats containing numerous thistle-heads, with a request that these should be identified, and that he should be informed as to whether there was any chance of spreading the weed by feeding the oats to horses.

The heads were female ones of Californian thistle (*Cnicus arvensis*), which the accompanying photograph of the sample taken just as it was received clearly shows. Moreover, when one or two heads were pulled to pieces numbers of well-filled seeds were found.

PART OF SAMPLE OF OATS CONTAINING CALIFORNIAN-THISTLE HEADS.

[*Photo by H Drake.*

The effect on their germination of the passing of naked Californian-thistle seeds through the alimentary canal of horses has not been definitely shown by experiment, but it must be plain, to say the least of it, that there decidedly *is* a chance of spreading the thistle by the feeding to any animals of such oats as those illustrated, and it would be a most unwise thing for a farmer to do.

Esmond Atkinson, Biological Laboratory, Wellington.

Calcium Cyanide for Orchard and Garden Pests.—Last season a considerable amount of experimental work was carried out by the Biological Laboratory with calcium-cyanide dust, and good controls were secured against bronze-beetle, apple-leaf hopper, rose-aphis, and woolly aphis, but not red mite.

TESTING OF PUREBRED DAIRY COWS.

OCTOBER CERTIFICATE-OF-RECORD LIST.

Dairy Division.

ANOTHER CHANGE IN JERSEY CLASS-LEADERS.

THE October C.O.R. list, printed below, records the performance of a new leader for the three-year-old Jerseys. Ivondale Golden Lass, bred and tested by Mr. P. J. Petersen, of Brixton, near Waitara, has now gained a certificate for the very fine record of 905·01 lb. butterfat, thus increasing the leadership figures for her class by 107·69 lb. Ivondale Golden Lass was 3 years 312 days old at commencement of test; the previous class-leader, Mr. A. Christie's Loo's Queen, commenced her test at the age of 3 years 332 days and gained a certificate for 797·32 lb. butterfat. Ivondale Golden Lass also has a C.O.R. for 601 lb. butterfat in 273 days as a senior two-year-old.

Ivondale Golden Lass is a half-sister to Mr. Petersen's heifer Ivondale Golden Rainbow, who stands at the head of the senior two-year-old Jerseys, as noted in last month's *Journal*, the sire in each case being Aster's Golden Lad. The dam of Ivondale Golden Lass is Ivondale Heather's Girl, who has a C.O.R. for 433·92 lb. butterfat in 302 days, at a commencing age of 3 years 339 days. Ivondale Golden Lass has now been purchased by Mr. A. E. Watkin, of Takanini.

A NEW MILKING-SHORTHORN CLASS-LEADER.

Last month's list included particulars of performance for Messrs. Ranstead Bros.' Matangi Quality 5th, and opportunity is now taken of announcing that this heifer thereby goes to the head of her class, the senior two-year-olds, her yield of 542·66 lb. butterfat defeating the previous class-leader—Mr. Bowis's Mereside Gem—by 61 lb. Matangi Quality 5th commenced her test at the age of 2 years 204 days, and Mereside Gem at 2 years 350 days. Matangi Quality 5th is a daughter of Matangi Quality 4th, one of the best-known Milking Shorthorns in the Dominion. She promises to be a worthy successor of her outstanding dam, who still holds two class-leaderships for the breed.

CERTIFICATES OF RECORD ISSUED IN OCTOBER, 1926.

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat reg'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS.	Yrs. dys.	lb.		lb.	lb.
Junior Two-year-old.						
Jerseydene Sungleam	A. E. Phillips, Maunu ..	2 46	245·1	365	9,662·8	603·67
Alfalfa Mistress ..	A. A. Wagstaff, Waihou ..	1 300	240·5	334	8,922·7	549·03
Orange Dale Violet ..	W. J. Hall and Son, Matatoki	1 355	240·5	365	10,548·6	538·61
Goodwood Clarionet ..	B. N. and W. A. Sandilands, Feilding	1 287	240·5	350	8,508·8	526·87
Jersey Lea Betty Ann	S. Bowker, Ihakara ..	2 35	244·0	365	9,348·9	518·66
Ku Ku Leaflet ..	W. Devine, Palmerston N.	1 326	240·5	365	9,818·2	493·86
Middlewood Lucy ..	B. N. and W. A. Sandilands, Feilding	1 294	240·5	348	7,765·0	489·50
Meadowvale Lady Wayward	E. O'Sullivan and Sons, Tariki	1 350	240·5	365	7,336·4	476·19
Jersey Brae Golden Fox	T. Church, Te Rapa ..	1 358	240·5	364	7,262·0	475·45
Lincoln Laura ..	Dyer and McGuinness, Carterton	2 10	241·5	365	8,507·3	468·30
Miro Meadows Consort	A. A. Ward, Tariki ..	1 343	240·5	365	7,541·6	466·71
Creekton Wee Koura	C. Brock, Eltham ..	2 59	246·4	358	9,306·8	461·02
Jersey Brae Gypsy ..	T. Church, Te Rapa ..	2 25	243·0	363	7,158·9	448·59
Ngahiwi Rosemary ..	W. J. Freeth, Waitara ..	1 310	240·5	365	7,827·6	446·27

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Jersey Brae Lily ..	T. Church, Te Rapa ..	2 33	243·8	365	7,463·3	442·36
Peaceful Princess ..	B. N. and W. A. Sandilands, Feilding	1 307	240·5	365	7,061·8	441·55
Elcho Faith ..	C. J. Masters, Hunterville ..	2 85	249·0	365	8,644·2	439·46
Llangollen Fairy ..	J. T. Entwisle, Cambridge ..	1 349	240·5	365	8,118·9	438·41
Besses Golden Viola ..	H. Stonex, Bell Block ..	2 54	245·9	334	6,375·6	437·06
Vernon Lavender ..	G. R. and H. Hutchinson, Auckland	1 344	240·5	354	7,533·3	434·22
Favourite's Belle ..	A. J. Harris, Bombay ..	2 13	241·8	364	7,993·2	433·52
Marshlands Flower ..	W. J. Chynoweth, Hamilton	1 363	240·5	365	7,109·1	430·23
Ngahiwi Lady Demure	W. J. Freeth, Waitara ..	1 345	240·5	365	7,467·1	416·68
Ivondale Yellow Carnation	J. Cole, Waitara	1 346	240·5	365	8,669·2	405·01
Marshlands Butterfly	W. J. Chynoweth, Hamilton	2 9	241·4	365	5,912·0	397·48
Roslyn Genoa Fairy ..	J. Harris, Bombay ..	1 324	240·5	365	7,795·2	388·71
Sunnyridge Princess ..	J. J. O'Reilly, Westmere ..	1 350	240·5	365	6,641·4	385·79
Songstress	H. W. Le Bailly, Buckland	2 48	245·3	358	7,202·2	379·49
Fairlands Lady ..	J. Klenner, Kaimata ..	2 84	248·9	301	6,557·0	368·97
Jersey Brae Fascination	T. Church, Te Rapa ..	2 16	242·1	361	6,343·9	368·91
Linden Grove Ladylike	B. N. and W. A. Sandilands, Feilding	2 26	243·1	310	7,118·1	367·53
Meadowvale En Fete	S. H. Wickstead, Stratford	1 307	240·5	275	5,692·4	364·63
Waihoehoe Rose ..	E. Feilding, Drury ..	1 245	240·5	337	6,595·6	360·13
Gowanlea Native Girl	F. Hirst, Marangai ..	2 16	242·1	365	6,203·0	355·96
Peggy's Pride ..	G. Bright, Otaua ..	1 276	240·5	365	6,272·1	355·15
Rozel's Blue Ribbon	G. Buchanan, Paeroa ..	1 306	240·5	365	5,712·3	351·66
Ohio Eminence ..	Mrs. M. A. Wright, Piarere	2 64	246·9	342	6,264·5	350·76
Marshlands Eminence	W. J. Chynoweth, Hamilton	2 40	244·5	365	6,143·3	347·22
Kelvin Fuchsia ..	G. Buchanan, Paeroa ..	1 311	240·5	304	5,931·5	345·50
Caerleon Nemesia ..	W. J. Hall and Son, Matatoki	1 264	240·5	305	6,047·8	344·78
Wyoming Miss Joan ..	A. J. Haseltine, Hawera ..	2 67	247·2	365	5,860·0	341·69
Brookley Gentle ..	W. Johnson, Ngaere ..	2 7	241·2	310	5,178·5	333·97
Kelvin Rosy ..	G. Buchanan, Paeroa ..	1 334	240·5	346	5,503·1	333·96
Arthingworth Viola ..	E. Smallbone, Richmond ..	1 310	240·5	365	6,457·4	329·44
Hill Grange Ruby ..	J. Robertson, Haumoana ..	2 21	242·6	351	7,846·0	325·76
Campanile's Diana ..	R. E. Clements, Dargaville	1 286	240·5	365	5,087·7	324·67
Matai Nui Marcia ..	D. L. A. Astbury, Mangatoki	1 299	240·5	365	5,822·6	315·81
Holmvale Jewel ..	J. W. Topham, Temuka ..	1 155	240·5	351	4,904·6	315·13
Brookley Bonny ..	W. Johnson, Ngaere ..	2 27	243·2	318	4,961·1	314·19
Kuranui Petal ..	Owen Glynn, Morrinsville ..	1 351	240·5	303	5,525·5	293·84
Kelvin First Lady ..	G. Buchanan, Paeroa ..	1 308	240·5	346	5,578·4	285·46
Marshlands Violet ..	W. J. Chynoweth, Hamilton	2 33	243·8	223	4,870·8	284·18
Holmvale Lily's Beauty	J. W. Topham, Temuka ..	1 353	240·5	279	5,240·0	273·29
Meadowvale Painted Lady	S. H. Wickstead, Stratford	1 357	240·5	333	4,172·0	262·37
Wyoming Brooklet ..	A. J. Hazeltine, Hawera ..	2 29	243·4	291	5,096·4	245·29
Senior Two-year-old.						
Auroa Ruby ..	J. C. Duff, Auroa ..	2 289	269·4	365	8,911·3	554·61
Earlston Jean ..	Chisholm Bros., Hunterville	2 303	276·8	365	10,431·3	551·80
Alfalfa Retford Lass	A. E. Phillips, Maunu ..	2 305	271·0	365	10,400·0	551·61
Vernon Cherry Bloom	G. R. and H. Hutchinson, Auckland	2 302	270·7	345	9,626·4	542·83
Sunnyridge Lass ..	J. J. O'Reilly, Westmere ..	2 293	269·8	365	11,868·9	527·48
Leighurst Naughty ..	G. R. and H. Hutchinson, Auckland	2 302	270·7	360	8,194·2	510·07

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Senior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Amourelle	H. W. Le Bailly, Buc land	2 315	272·0	361	7,780·8	465·30
Marshlands Queen Bee	W. J. Chynoweth, Hamilton	2 350	275·5	365	6,971·4	435·04
Hill Grange Pilgrim ..	J. Robertson, Haumoana ..	2 298	270·3	365	9,008·7	425·08
My Lady Aldan ..	J. Robertson, Haumoana ..	2 266	267·1	349	7,126·5	380·81
Tyrone Lass ..	R. J. Johnston, Runciman	2 130	253·5	365	5,936·8	348·31
Silverdale Bridget ..	H. R. Snell, Ngunguru ..	2 356	276·1	324	5,943·5	345·82
Tirohia Superlative ..	B. E. Veale, Tirohia ..	2 137	254·2	365	5,729·0	324·78
Three-year-old.						
Ivondale Golden Lass	P. J. Petersen, Waitara ..	3 312	308·2	365	14,434·8	905·01
Akite	F. S. McRae, Palmerston N.	3 162	293·2	365	10,994·1	668·02
Kahuwera Pansy ..	J. V. Mortensen, Piopio ..	3 357	312·7	364	10,426·9	589·19
Marshlands Maid ..	W. J. Chynoweth, Hamilton	3 336	310·6	365	10,120·1	549·00
Ivondale Golden Star	C. J. Masters, Hunterville ..	3 325	309·5	321	10,958·1	544·20
Kaimata Countess ..	J. Klenner, Kaimata ..	3 13	278·3	345	8,735·3	507·81
La France	G. S. Clarke, Te Awamutu ..	3 28	279·8	365	9,899·6	484·99
Springvale Ada ..	R. C. Powell, Bunnythorpe	3 321	309·1	329	8,478·1	474·98
Pansy's Eileen ..	H. C. Barker, Papakura ..	3 271	304·1	365	8,930·8	490·47
Lady Erica ..	A. Best, Bombay ..	3 33	280·3	365	8,578·5	466·57
Peaceful's Lady ..	B. N. and W. A. Sandilands, Feilding	3 323	309·3	341	7,704·0	452·09
Miro Meadows Freesia	A. A. Ward, Tariki ..	3 36	280·6	365	7,082·2	422·96
Glad Tidings ..	J. E. Barker, Wardville ..	3 325	309·5	286	7,304·9	419·72
Kopipi Verna ..	H. R. Snell, Ngunguru ..	3 71	284·1	323	6,550·7	409·82
Crepe de Chine ..	R. J. Johnston, Runciman	3 40	281·0	350	5,615·1	384·62
Four-year-old.						
Glen Naspa ..	A. Dodunski, Egmont Village	4 281	341·6	365	14,753·3	739·27
Oak Farm Magic Wonder	G. B. Knowles, Tariki ..	4 346	348·1	365	12,894·2	648·22
Fernside Norma ..	A. D. Walker, Ngaere ..	4 1	313·6	357	10,299·5	580·80
Springvale Rose ..	R. C. Powell, Bunnythorpe	4 320	345·5	359	9,187·9	560·21
Victoria's Welcome ..	A. D. Walker, Ngaere ..	4 223	335·8	355	9,529·2	517·45
Waionui Goldie ..	Estate of A. S. Lindsay, Whatawhata	4 253	338·8	365	8,357·5	491·79
Poppy of the Glens ..	A. C. Lovelock, Woodville ..	4 6	314·1	365	10,557·4	486·27
Butternut Lassie ..	R. K. Garland, Okauia ..	4 348	348·3	365	6,959·9	462·88
Sultan's Dolly Dimple	J. R. Colson, Waihou ..	4 331	346·6	365	8,627·9	444·26
Lorna Doone ..	G. P. Catley, Ohau ..	4 307	344·2	272	8,433·0	440·29
Orange Dale Hazeline	Estate of A. S. Lindsay, Whatawhata	4 252	338·7	365	7,415·0	423·48
Mature.						
Orange Dale's Lily ..	W. J. Hall and Son, Matatoki	5 332	350·0	365	12,348·6	723·00
Lorelei	J. Townsend, Puni ..	7 185	350·0	365	11,225·8	678·66
Alfalfa Cicero Fontaine	J. W. Topham, Temuka ..	5 142	350·0	365	12,072·0	656·24
Woodland's Gipsy ..	J. G. Morgan, Ngawapurua	5 352	350·0	365	10,964·0	651·41
Mary's Sunbeam ..	G. B. Knowles, Tariki ..	6 308	350·0	365	11,140·2	635·32
Celandine	C. J. Masters, Hunterville ..	5 355	350·0	361	10,996·9	600·52
Park Queen's Mary..	J. R. Colson, Waihou ..	9 14	350·0	365	11,569·4	583·38
Lady of the Glens ..	W. Anderson, Aokautere ..	5 13	350·0	365	12,267·3	569·83
Fern Grove Xmas Gift	C. J. Masters, Hunterville ..	9 254	350·0	339	10,990·1	569·79
Awatune Betsy ..	C. J. Masters, Hunterville ..	5 5	350·0	350	11,801·3	558·24
Auroa's Lassie ..	J. C. Duff, Auroa ..	5 340	350·0	365	10,578·1	546·17
Jersey Lea Creamy ..	S. Bowker, Ihakara ..	7 299	350·0	365	11,488·5	544·41
Spec's Fairy ..	A. J. Harris, Bombay ..	5 274	350·0	365	9,547·7	541·42

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Mature—continued.		Yrs. dys.	lb.		lb.	lb.
Fantasia	Estate of A. S. Lindsay, Whatawhata	5 242	350·0	365	8,876·8	535·16
Crofton's Queen ..	A. J. Luxton, Omata ..	6 23	350·0	341	8,654·4	531·31
Crimson Rambler ..	J. Mitchell, Woodville ..	7 352	350·0	365	11,802·5	530·35
Sea View's Lady Enid	C. P. Crowley, Kaponga ..	5 323	350·0	365	9,757·6	521·92
Orange Dale's Concord	W. J. Hall and Son, Matatoki	6 1	350·0	334	8,984·9	509·57
Miro Meadows Dot ..	A. A. Ward, Tariki ..	8 322	350·0	365	9,460·7	489·67
Magnet's Leila ..	J. Hale, New Plymouth ..	7 17	350·0	365	8,998·3	484·04
Meadowvale Sweet Dairylike	E. O'Sullivan and Son, Tariki	5 340	350·0	295	9,388·4	480·41
Reid Park's Miss Lizzie	E. J. Adams, Puni ..	5 353	350·0	350	8,666·2	472·50
Oak Farm Rosemary	G. B. Knowles, Tariki ..	5 6	350·0	308	8,661·7	468·14
Ardenlea's Hope ..	G. B. Knowles, Tariki ..	6 41	350·0	365	10,188·2	463·13
Jersey Lea Sweet Maid	S. Bowker, Ihakara ..	6 344	350·0	357	8,086·2	453·85
Snow View Pearl ..	H. Salway, Bell Block ..	5 298	350·0	348	7,411·0	453·74
Charm's Gilt ..	G. Buchanan, Paeroa ..	7 145	350·0	307	8,010·4	408·88
Nessie	J. Blake, Puni	5 272	350·0	342	9,179·8	403·71
	FRIESIANS.					
Junior Two-year-old.						
Melrose Sylvia Griselda Keyes* ..	T. Sherriff, Clandeboye ..	2 31	243·6	365	14,416·7	555·20
Lakeside Netherland Patch 2nd	G. H. Hassall, Clarkville ..	2 160	256·5	343	13,649·2	475·41
Oaklea May Echo Audry†	C. Cates and Son, Kumeu ..	2 168	257·3	365	12,676·8	413·02
Dom. Queen Colantha Jessie	Central Development Farm, Weraroa	1 331	240·5	365	10,483·1	369·12
Senior Two-year-old.						
Totara Park Pietje Alva*	Piri Land Company, Auckland	2 345	275·0	365	17,081·1	599·80
Cluny Queen Coralie	Piri Land Company, Auckland	2 333	273·8	365	16,673·2	565·74
Hanley Butterfly ..	G. H. Hassall, Clarkville ..	2 258	266·3	365	14,418·6	466·26
Senior Three-year-old.						
Bainfield Sylvia Topsy 4th	Mickell Bros., Te Horo ..	3 350	312·0	364	17,540·1	804·73
Dominion Olga of Rock	Central Development Farm, Weraroa	3 271	304·1	365	15,306·5	629·43
Junior Four-year-old.						
Rosevale Sylvia Model Keyes	T. Sherriff, Clandeboye ..	4 166	330·1	365	22,599·4	754·73
Waihi Pietertje de Kol Girl*	J. E. O'Shea, Ohangai ..	4 22	315·7	350	17,461·2	608·47
Springbank Tensen* ..	Wood Bros., Tikorangi ..	4 11	314·6	365	16,802·3	556·65
Hillside Duchess ..	Mickell Bros., Te Horo ..	4 84	321·9	278	13,611·5	537·84
Mature.						
Princess Korndyke ..	W. J. Eames, Hunterville ..	5 319	350·0	365	15,029·2	515·57
Woodlands Cletus* ..	Wood Bros., Tikorangi ..	5 28	350·0	365	14,192·3	493·12

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	MILKING SHORTHORNS.					
Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Ridgway Molly* ..	E. Ridgley, Waiuku ..	2 10	241·5	365	11,768·7	515·02
	AYRSHIRES.					
Mature.						
Floss of Braeside ..	Robertson and Blackley, New Plymouth	5 275	350·0	365	14,907·4	678·58
Lady Locket 2nd of Edendale	W. Hall, Lepperton ..	9 286	350·0	365	11,726·5	466·00
	RED POLLS.					
Mature.						
Sylph	Central Development Farm, Weraroa	11 30	350·0	348	9,438·2	409·13
	Second-class Certificates.					
	Jerseys.					
Junior Two-year-old.						
Elcho Fern	C. J. Masters, Hunterville ..	1 343	240·5	365	7,768·6	418·35
Senior Two-year-old.						
Wichenford Daisy ..	F. I. Washbourn, Timaru ..	2 159	256·4	365	5,976·7	302·95
	Friesians.					
Junior Two-year-old.						
Bainfield Sylvia Mimosa 2nd	R. K. Macdonald, Edendale	2 123	252·8	365	12,365·3	400·38

BAINFIELD TOPSY 10TH (O. A. CADWALLADER, GREYTOWN).

C.O.R., 1925, in Friesian junior four-year-old class : 22,456 lb. milk, 863·89 lb. butterfat.

SEASONAL NOTES.

THE FARM.

HAYMAKING.

DURING the coming month and in January haymaking will be in full swing. Quality in hay is of first importance, and mowing should commence at the right time—that is, when the majority of the plants are in flower. At this period all parts of the plant are more digestible and nutritious than when harvesting is long deferred. The same remarks refer to special hay crops. The next important matter is to save the crop in good condition, and where the grass is dense and heavy it is doubtful whether it can be properly saved without having first been cocked. This method also ensures quality, colour, &c.; there can be no doubt that heavy crops stacked immediately from the swath are very liable to overheat and spoil.

High ground in a convenient position should be chosen for the stack, and plenty of material provided for the stack-bottom. It is well to underestimate the size of the stack slightly rather than overestimate it, for too often faulty roofs result from a shortage of material. During the building distribute 10 lb. or more of clean, coarse salt per ton of hay. This addition greatly assists palatability, more especially where the material is inferior. Aim to build high, so that the roof area will be small and pressure good.

The aftermath of the hayfield is very valuable, for as a rule it has a high clover content, and, if possible to save, it proves most useful when the grazing pastures begin to fail.

ENSILAGE.

Fields that were shut up early will be ready for ensilage about the end of November. It is important that they be cut as soon as ready, as better ensilage is made, and when the grass is removed early there is usually a good growth of clovers and fine grasses before the warm, dry weather sets in. This is very important if a good grazing aftermath is to be secured. Frequently one sees aftermaths left until they develop into strong, rough growth. This is a great mistake; aftermaths should be carefully grazed as recommended for ordinary pastures, so as to keep the growth fresh and succulent. It is quite good policy to give the hay or ensilage field from 1 cwt. to 2 cwt. of super per acre immediately after the crop has been removed.

Of the various methods of making ensilage perhaps the cheapest and most convenient is the hillside silo, but in many cases a suitable site is not obtainable and the stack method must be resorted to. For this the minimum quantity of material made should be not less than 40 tons, which would require a base of 14 ft. by 14 ft. Sufficient material should be cut and carted to build 6 ft. or 8 ft. in height the first day, and this should then be allowed to stand until a temperature of at least 130° F. is reached, but at no time more than 150° should be attained. The building-up of more material is then continued from

time to time, as heat is generated in each successive layer. For the regulation of heat a thermometer is required, but experienced ensilage-makers are often able to dispense with it. It is always advisable to have a sheet to fasten on to the windward side of the stack, since any wind blows the heat to one end unless such protection is afforded. The dispersion of heat in the stack through this cause is often responsible for badly made ensilage and uneven settling. The sides should be kept as tight as possible and perpendicular during building, and the heart level with or slightly below the outer edge. When the last layer has reached the required temperature the top should be weighted down with soil about 18 in. thick, thus preventing a further rise in temperature. The addition of salt improves the quality of the ensilage, and it is a convenient way of feeding salt to stock.

With lucerne the flowering stage is not a good indication as to the time for cutting. This may be judged better by an examination of the crown; when the new shoots are about 1 in. in length the crop is ready. Lucerne cut for hay should not be allowed to dry too rapidly, and should be handled as little as possible. It may be stacked a little on the green side, but on no account must it be moist with dew or rain.

THE GROWING ROOT CROPS.

Root crops to be thinned, such as mangolds and carrots, and even turnips where they have been sown in wide drills, should have attention as soon as ever the plants are advanced enough to stand the operation, so that they may become well established before the dry weather sets in. Turnips should be thinned to 10 in. or 12 in. apart, mangolds about 1 ft., and carrots 6 in. apart in the drills. At one time it was considered correct to thin mangolds to 18 in. apart, but experience shows that 12 in. generally gives the best results. Medium-sized sound roots should be aimed at rather than big coarse roots of low feeding-value. The land between the drills should be kept well cultivated with the horse or hand hoe to keep down weeds and develop crop-growth. A few hours' work at this time will save days later on.

In most proprietary mangold-manures a little nitrogenous fertilizer has been added, and this is usually sufficient, but should the mangold-plants look pale and appear to be standing still after thinning a top-dressing of $\frac{1}{2}$ cwt. of nitrate of soda per acre will frequently give them a fresh start. If, on the other hand, the plants are growing well and have a good colour they are better without the nitrate. Nitrate of soda should be applied on a damp day. If the manuring has not been too liberal both carrots and mangolds will greatly benefit from 1 cwt. per acre of super broadcasted after thinning.

SOWING OF SWEDES.

In districts where swedes are still a staple crop the latter part of December is the best time to sow, unless earlier sowings have been proved by experience to be satisfactory. The later the crop is sown the less likely it is to be affected by dry-rot; on the other hand, if left too late there is the danger of dry weather and a poor strike. Superlative, Masterpiece, Vilmorin's White Purple-top, Magnum Bonum,

Grandmaster, and Up-to-Date are among the best varieties. They are all liable to attacks of dry-rot (particularly Superlative), but Grandmaster and Up-to-Date are the most resistant. A fine, firm, moist seed-bed is essential, in order that the crop may make a good start and so stand a good chance against the "fly." From 10 oz. to 14 oz. of seed should be sown through every second coulter of the drill; the better the land and seed-bed the less seed will be required. New seed of reliable origin should always be used; old seed is very apt to give disappointing results. Artificial manures should be used with the seed at the rate of 3 cwt. per acre. Most of the proprietary manures give good results, but where the farmer wishes to mix his own equal parts of superphosphate (44–46 per cent.) and basic slag or Ephos phosphate will be found suitable. If slag and super are mixed the material should be used immediately, else it will set into a hard mass. On old land which has been under cultivation for a long period of years ½ cwt. per acre of sulphate of potash added to the aforementioned mixture should be advantageous. Care must be taken that a run-off pasture is available adjacent to the swede-paddock when the crop is fed off. Failing this a supply of hay will be a great asset.

POTATO CROPS.

Potato crops should receive attention by horse-hoeing and moulding up as growth progresses. Spraying should be done during early growth, and repeat dressings given as required. A suitable spraying-mixture is Burgundy mixture, which is made as follows: Dissolve 4 lb. of sulphate of copper in a 40-gallon barrel; then add water to make up to 35 gallons. In another vessel dissolve 5 lb. of washing-soda in 5 gallons of water. When the soda is completely dissolved add two of copper sulphate to one of washing-soda, stirring vigorously all the time. The mixture should be bright blue in colour, and used within ten hours of mixing. —*Fields Division.*

THE ORCHARD.

CULTIVATION.

CULTIVATION should continue to receive special attention, so as to prevent excessive evaporation of soil-moisture. This important work should be repeated frequently to prevent a crust forming on the surface of the soil.

GRAFTS AND DISBUDDING.

Growers are advised to make an inspection of trees grafted in the spring, and stop the growth which develops on the stock below the grafts. When scions commence to swell, the ties should be cut through with a sharp knife on the side of the stock opposite to that on which scions were placed. Do not remove ties or wax.

Remove from the roots and trunks all suckers and superfluous shoots, so that the energy of the tree may be directed towards the development of leaders, laterals, and fruits. Surplus and misplaced growth in the heads of the trees which would be removed at the winter pruning should now be carefully cut out or pinched back, according to which practice will give the desired result.

THINNING.

Practically all danger from frost is now over, and where thinning is necessary and has not been completed stone-fruit growers should proceed without delay to thin out sufficiently to give the remaining fruits ample opportunity for proper development. Pip-fruit growers too often neglect this important operation. The excuse freely given is that no time was available for the work, and that it costs too much. Those growers who have regularly thinned their crops have proved beyond any doubt that thinning pays, and that it helps the tree in many ways. (See last month's notes.)

Thinning is very much a matter of judgment of the individual orchardist. In thinning apples and pears he must consider the variety, habit of bearing, vigour of the tree, distribution of the crop, cultivation, and season, and thin accordingly. The diseased, small, and misshapen fruits should be removed first, and the remaining fruits on normal bearing trees thinned out to from one to two fruits to a spur. On heavy alternate-year bearing varieties it is good practice to leave fruit only on each alternate spur, in order to encourage annual bearing. In the drier districts less fruit may require to be left on the trees in order to develop the crop of fruit to perfection. Scarlet Nonpareil, Cleopatra, Sturmer, Cox's Orange, Yates, and Dougherty require special attention in order to produce good-sized, well-conditioned fruits and to maintain satisfactory tree development and growth.

The setting fruit should be removed from the leaders for a distance of from 15 in. to 18 in. from the tops of the leaders. Jonathan and Rome Beauty are varieties which require special attention in this respect. Stunted and young trees should be heavily thinned.

PICKING.

In preparation for the handling of the new season's crop clean up in and around the packing-shed. The cases and trays should be made up early so as to allow the timber to dry out properly before being used. Repair picking-boxes and ladders, and when necessary replace with new ones.

Before next month's notes appear growers of cherries and early-ripening varieties of peaches and apricots will have commenced to harvest their crops. Pickers, graders, and packers should use every care in the handling of the fruits. The proper degree of maturity at which the fruit should be gathered will vary considerably according to the kind and variety of fruit and the conditions of growth. Fruits should be picked when they have developed their desirable qualities to the fullest extent, or are mature and sufficiently ripe for the particular market to which they are to be sent. The distance fruits have to be sent is an important factor in determining the degree of ripeness at which they are to be picked. The following suggestions are worthy of consideration by growers :—

(1.) The fruit should not be gathered when wet, as moulds and rots quickly develop and damage the fruits. (2.) Where possible, pick fruits during the coolest part of the day. (3.) Do not break off fruit buds, as they are required for next season's fruit crop. (4.) Do

not fill orchard boxes so full as to cause the fruit to be crushed or damaged. (5.) Do not allow fruit to stand out in the hot sun. (6.) Pick at the proper time; fruit picked too early is of poor quality and not suitable for use; fruit picked too late usually arrives on the market in an overripe or rotten condition. (7.) Handle the fruit carefully; lay it in the picking-bucket; do not drop it, as damaged fruit deteriorates quickly. (8.) Have ample and suitable picking equipment. (9.) From three to four pickings at intervals should be made. (10.) Whenever possible, pack directly from the picking-bucket.

Cherries require to be fairly ripe before they are picked, and should be carefully harvested so as to secure part or all of the stem. All blemished, stemless, misshapen, or green fruit should be thrown out by the pickers. Do not touch the fruit any more than can be helped. Apricots, peaches, nectarines, and plums require to be gathered when hard ripe, and should be matured enough so that they will continue ripening and have a good flavour. Apricots should show a tinge of yellow over most of the fruit. Peaches and nectarines should have lost the deep-green cast; white-fleshed varieties should show a light green or silvery-white colour, and yellow-fleshed varieties a golden-yellow tinge on the sunny side. Plums should be picked with stems intact, and care taken not to rub off the bloom.

GRADING AND PACKING.

Proper grading and packing are very important, as a good neat pack helps the sale of the fruit. All blemished and misshapen fruit should be discarded. Every endeavour should be made to grade the fruit to sizes. There should be little variation, because the use of different-sized fruits makes it impossible for the packer to pack the tray or case to the best advantage. It pays to grade all fruits, and to market the fruit in clean, new packages on which the required information has been neatly and clearly stencilled.

SPRAYING.

Spraying for pests and diseases should be along the lines set out in the calendar published in the September *Journal* notes. The most troublesome requiring attention at this period are codlin-moth, leaf-roller caterpillar, pear-slug, red mite, apple-leaf hopper, aphis, black-spot, powdery mildew, and brown-rot. Growers should use every endeavour to control these pests and diseases, and not try to economize by omitting a spray. If in doubt as to whether another application should be made, it is best to be on the safe side and spray again.

It is necessary in order to obtain the best results to supplement spraying by destroying all fallen and infested fruits, and cutting out of badly infected and dead twigs and branches. Growers who have any difficulties in respect to this or other matters pertaining to the orchard are advised to communicate with the Orchard Instructor for the district in which they are situated.

—W. K. Dallas, Orchard Instructor, Dunedin.

Citrus-culture.

Cultivation: At this period of the year it pays to give strict attention to cultivation. The land should be worked sufficiently to reduce the surface to a fine tilth, and often enough to keep the surface friable. With the period of minimum rainfall to hand all moisture should be conserved by preventing evaporation and by the suppression of weeds. After light rains, which are to be expected, the surface should be reworked in order to break the crust, otherwise intense evaporation takes place not only of the moisture of recent falls, but also reserve moisture drawn from lower levels.

Sprays: Bordeaux, 4–4–40, should be applied periodically to cover the fruit immediately after petal-fall and to protect the growing fruits. A summer insecticide of oil, 1-60, or Black Leaf 40, 1–800, is required in order to make a thorough job of insect-control and supplement the autumn or spring spraying. Black Leaf 40 may be added to the bordeaux for application.

Pruning: As active growth is resumed there is a tendency for long growths to be made. It is not uncommon to find a rapid growth from 2 ft. to 3 ft. extension without any side growth. Division at the tip takes place, and thus are formed the long objectionable growths. If, however, these rapid-growing shoots are tipped at, say, 1 ft. long, side shoots of a good fruiting-quality are produced and the tree kept within reasonable bounds. As undesirably placed shoots are produced they should be cut away when quite young, this allowing better maturity to those allowed to remain.

—W. H. Rice, Orchard Instructor, Auckland.

POULTRY-KEEPING.

MANAGEMENT OF THE YOUNG STOCK.

At this period of the year there are several matters which the poultry-keeper cannot afford to neglect if the greatest profit is to be made from the plant. No effort should be spared to keep the quarters in a thorough sanitary state to guard against the birds being attacked by insect pests. It is well to remember that these parasites multiply at an alarming rate at this season of the year. Do not be lured into a false sense of security by having new houses. Although the quarters may be comparatively new, it is of the greatest importance that all causes favourable to insect-life be frequently removed. This implies strict attention to cleanliness, the provision of good dusting-places, combined with periodical sprayings of disinfectant.

Do not be tempted to overcrowd the growing birds. This weak policy is bad enough where adult stock is concerned, but it is especially a weak policy in the case of the growing bird. It should not be thought that because the birds have passed the brooder stage special care and management are not as essential as during the brooder stage. If the birds are to grow into vigorous and profitable stock—and they will be profitable only if they are vigorous—this can only come from careful treatment through all stages of their development, not only in the matter of diet, but by comfortable housing without coddling. Confined quarters are not desirable for growing birds. Wherever possible, give

the pullets a free range. In this way they will find for themselves much natural food, and at the same time secure natural exercise—that great essential for vigorous growth. What applies in the case of the pullets applies in equal force to the cockerels intended for future breeding purposes.

Some poultry-keepers provide nothing but small coops for the birds to sleep in after being drafted from the brooder. This is a mistake. If the young stock are to do their best they should be provided with a roomy, partly open-fronted building in which they can remain on cold and wet days, and yet have ample exercise by scratching in litter for their food. No care or attention is too good for the growing pullets, from which so much is expected in heavy production later. Do not on any account keep a weak bird on the plant. All hens of the drone type, and surplus cockerels that have attained a marketable age (about five months old), should be weeded out without delay. Always remember that the food bill is the most serious factor of the business at the present time.

Separate the males from the females before the cockerels commence to crow. This will be to the advantage of both sexes. Do not practise the foolish policy of using inferior foodstuffs because they are cheap. The best, even if it costs more, is always the cheapest in the long-run.

CHRISTMAS DUCKLINGS.

Ducklings now hatched and being reared for the Christmas market must be fed and managed to the best advantage if the maximum price is to be secured for them. A good fattening diet consists of equal parts of maize-meal, pollard, and bran, well moistened with skim-milk, and where the latter is available it should be given to the birds to drink. Feed at least three times a day as much as the birds will eat without waste. In addition, finely chaffed succulent green material should be supplied daily. Where ducks are undergoing the fattening process they should not be given water to swim in; they will do much better without it.

GREEN FOOD.

On all plants no time should be lost in regard to providing for an abundance of green food for future use. Where there is a stale run, this should be turned over, well limed, and planted with a suitable green material. Do not think that because there is grass in the run this will provide the necessary green food for the growing stock, or indeed any class of poultry. As a general rule any grass that may be in the run, excepting during the spring, is rank and contains too much fibrous material to be of any real value as a green food. Besides, grass in a rank condition is never palatable to fowls. Among other things that may be grown are any of the cabbage varieties or silver-beet, and mangolds, also oats for chaffing in their green succulent state. Of course, as a permanent crop lucerne takes pride of place.

DIET FOR THE GROWING PULLETS.

A correspondent asks if it is advisable to have meat-meal in hoppers at all times for his pullets to pick at after they have attained an age of two months. Personally, I do not recommend this. The food supplied at this age should contain the elements needed to build up

frame and bone, rather than to develop the egg organs—or, in other words, prematurity—a condition which the overfeeding of meat is sure to bring about. The aim should be to bring the pullet naturally to maturity, and this can only be done by plain feeding of sound grain material, of which good plump oats should form a great part of the ration. This, together with an abundance of succulent green material, plenty of grit, and clean water, is all that they require.

It is far too common to see pullets commencing to lay at about four and a half to five months old, due to being supplied with too much animal food. This is a mistake, as such birds seldom grow to a desired size, nor do they produce a decent-sized marketable egg or one fit for hatching purposes. It is not generally known that when a pullet commences to lay she ceases to grow. Obviously, if a bird commences to lay at an early age it will remain a diminutive specimen of its breed. It is sound practice to give chicks a good supply of animal food—say, up to six weeks old—but between this period and until the pullets are well developed to the point of laying, forcing-food should be sparingly provided. Indeed, if it is observed that the pullets show the slightest signs of coming too early to maturity all forcing-food, such as meat or its substitutes, or even milk, should be left out of the ration.

A great weakness on some plants is to feed both the growing and the adult stock on the one class of food. I have seen cases where the morning mash contained a high proportion of forcing-material such as meat or blood meal, this being supplied to all the flock irrespective of age. Such food is specially demanded in the case of the heavy-laying bird, especially when it is intended to cull her out at the end of her productive period. With the growing bird, however, such a forcing diet is quite unnecessary, having the effect of forcing the bird to lay before it has attained a desired age and proper development.

The fact that the modern egg-producing type of pullet is put to a severe strain almost before it has attained maturity obviously goes to show that it should develop naturally and grow to a desired size, in order that it may have the power to resist disease and last out a long laying season. It is not when a bird commences to lay, but the number of good saleable eggs she will produce in two seasons, while at the same time being a desirable breeding-bird, that is the factor determining her value. The age of six months is soon enough for a pullet to start her period of production, and this may be extended in the case of the heavy breeds. The day has long passed for the view that early maturity is an index to profitable production and breeding-power.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

FORMING NUCLEI.

WITH the approach of the main honey-flow and the prospect of more settled weather the beekeeper can turn his attention to the question of forming nuclei, either with an eye to artificial increase or for queen-raising purposes. Whatever the object for which they are produced, the simplest method of forming nuclei is as follows: From the strongest

colonies in the apiary take combs of sealed brood with adhering bees. Place two of these combs in each nucleus hive, together with one comb of honey and an empty comb. It is as well, if the size of the hive will permit, to add a feeder. Close the entrance of the nucleus hive by tacking over it a piece of perforated zinc or wire cloth, and place the newly formed colony in a cool place for twenty-four hours. At the end of this time the hive may be placed on its permanent stand and the entrance opened. Some of the field-bees will return to the parent hives, but in the meantime much of the sealed brood will have hatched, and thus the absconders will hardly be missed. The small colony can at any time be given a ripe queen-cell, and under favourable weather conditions will soon possess a laying queen.

Nuclei can be built from one or two strong colonies, each of which should produce four or five small colonies; or several hives in the apiary may each be robbed of a frame of brood, thus providing increase while leaving the full colonies practically undiminished. When the young queen commences laying in a nucleus hive she should be left in possession until she has filled two frames with eggs, when she may be removed and given to a colony which requires requeening. The nucleus should at the same time be supplied with a ripe queen-cell, and the process repeated as long as young queens are required.

REQUEENING.

The most important bee within the hive is the queen, and it is useless to expect a colony to be productive unless she is a good one. It is therefore highly essential that all colonies should be headed with prolific queens of a good strain if vigorous workers are to be raised. Queen-rearing is an important adjunct in apiary-management, and unless provision is made to requeen systematically the beekeeper will find dwindling colonies and diminished crops. Where practicable, it is advisable to requeen the colonies every year. Exception, however, must be made in the case of hives containing breeding-queens, and others retained on account of desirable drones. Where the operations of the beekeeper are such as to prevent annual requeening, provision should be made to replace half the queens in the apiary each year. If this plan is followed no colony will have queens more than two years old. With the aid of a few nuclei young queens can easily be hatched and mated, but in many cases—especially where a swarm has emerged from a hive—virgin queens can be secured, and form an easy solution of the requeening problem.

No better plan can be followed by the beginner than to utilize queen-cells produced naturally—that is, under the swarming impulse. In New Zealand it has been proved that the best months for raising queens are from November to January. During this period everything is favourable to the operation, as the hives are at their highest state of prosperity. Under normal conditions the workers and drones are at their best, this being the swarming-period. There is practically no risk of robbing; the young queens are readily accepted, and will tend to reduce swarming. Moreover, a queen introduced during the months of prosperity will produce numbers of young bees for the winter, and still be fairly young in the following spring. In the case of after-swarms, these may be sifted through an excluder placed between two empty supers, when the queen or queens can be removed. The bees will then return to the parent hive.

These young queens can be utilized for starting nuclei. It always seems a pity to destroy the young vigorous queens bred under the swarming influence, and wherever there is an opportunity they should be saved and failing queens destroyed. A handy way of introducing virgin queens is by the smoke method. The old queen must first be removed from the hive that is to be requeened. The entrance is then contracted, and a few vigorous puffs of smoke are forced in at it. Then, before the bees have recovered from this treatment, the virgin queen is released at the entrance, piloted into the now queenless hive, and hastened therein by several more puffs of thick smoke. The hive is then closed altogether for about ten minutes, after which the entrance is once more opened slightly and left like this till the next day, when the full entrance can once more be allowed.

FINDING BLACK QUEENS.

It is a very difficult matter, even for experienced beekeepers, to find a black queen in a thickly populated colony by the usual method of looking over the frames. Much time and labour may be saved by adopting the sifting method. To do this, tack a queen-excluder on the bottom of an empty half-super; then nail on the excluder a piece of board about 4 in. wide and the length of the hive, so that its edge is flush with the side of the half-super. Now remove from the bottom-board the hive containing the queen to be found, placing it to one side. Put an empty super in its place on the stand, then over it the sieve or super with excluder. This should be placed so that the board on the bottom overlaps the hive below by about 4 in., which will leave a gap at the opposite side in which to replace the frames. Now place the hive over the sieve, lift out each frame with the adhering bees, starting from the nearest side, and quickly give each frame a sharp shake over the hive on the sieve so as to dislodge the bees. As each frame is done, place it in the hive below, sliding it along under the excluder; it will be gradually pushed along until it occupies its former position in the hive. When all have been done the remaining bees in the now empty hive may be dumped into the sieve. The bees will soon find their way down to the brood below, leaving the queen and the drones above the excluder, as they cannot get through the small holes. A little smoke will hasten the descent of the worker bees. The queen can then be found trying to get through to the brood below.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

TOBACCO-GROWING.

THE tobacco crop in the field will now be well established, and in many cases the plants will be of considerable size and covering most of their allotted space. Very little hoeing or cultivation will now be required, and the less traffic there is now among the plants the better. The success of the crop depends very largely on well-developed leaves free from all bruising and injury. This will be secured by disturbing the crop now as little as possible until compelled to go through it next

month, when the flower-buds will appear and the operation of topping has to be carried out. Meanwhile consideration might well be given to the curing-sheds and preparations for harvesting. Whether air curing, fire curing, or flue curing is to be done, the necessary supplies should now be ascertained and secured, the sheds cleaned up and repaired so that all sign of dampness and moulds are disposed of, and suitable arrangements made for the ventilation of every part of the building as required. One appliance that has been overlooked by some growers in the past is a suitable baling-press. A press of even the simplest description will ensure neat and rapid work when baling, and the delivery of the product in good condition. The broken leaf due to transportation in slack bales is excessive, and must be the cause of heavy financial loss.

TOMATOES.

The tomato crop under glass will now be in the middle of the harvesting-period, and packing and consigning fruit will keep the grower busy. To enable the top bunches to reach full development it is advisable to take steps to prevent the early attack of leaf-mould fungus, which develops rapidly in a humid, hot atmosphere. The tall, closely packed plants readily develop these conditions under glass, and great care is necessary in watering and ventilation.

The outside main crop will now be half-grown, and suckering and tying the plants to the supporting wires or sticks will take up a great deal of time. These operations compel an examination of each individual plant, and the opportunity might well be taken to note any sign of disease and any outstanding features of merit in the type of the plant. An early warning of trouble from disease is the main feature in the very best method of control, while in gardens where seed is saved for future sowing the selection must first be made of the parent plants. The selection of a few good fruits for seed from a box is an unsatisfactory method and a very common one. Of first importance is to select plants that are of good constitution, early maturing, and heavy bearing. These may be marked now, so that the pickers may reserve the fruit to allow it to reach full maturity for seed-saving. This work well repays the greatest care, as experience with tomatoes continually shows marked improvement or depreciation according to the amount of attention that is given to this important point. In case the matter is not dealt with again in these notes during the season it is as well to mention here the importance of keeping the seed from each plant separate, so that it may afterwards be sown separately, and thus a uniform strain eventually secured and maintained.

SMALL-FRUITS.

The berry-fruit harvest is now at its height. The supply generally is short, and, if well distributed, should meet a good demand. These valuable delicacies are in high favour, and few consumers usually have their requirements satisfied. The demand for syrups of this class of fruit is also increasing. The wooden buckets for consigning berries are expensive, and in many ways unsatisfactory. Reports to hand regarding the use of benzine-tins cut down to a suitable height and thoroughly lacquered show them to be a suitable container for jam fruits of this class.

To prune out the rank water-shoots in gooseberry-bushes is a timely attention. The red- and white-currant bushes will also benefit very much from a careful summer pruning at the present time.

THE VEGETABLE GARDEN.

The harvesting of early potatoes, peas, cabbage, cauliflower, and salads that is now taking place will leave land available for further cropping. The usual succession is the winter crops of celery, leeks, savoy cabbage, cauliflower, broccoli, and brussels sprouts. The young plants of these vegetables should now be about ready for lifting from the seed-beds at any time. In order that this planting may be finished early in the New Year the preparation of the land should proceed without delay, as the plants do best on cultivated land that has had time to settle down into a firm bed.

During the dry weather that is usual at this season these plants are often affected with the small green caterpillar of the diamond-backed moth, green aphis, and thrips, which often ruin a crop. The following spray is effective in defeating this attack: Take three teaspoonfuls of nicotine concentrate and 2 oz. arsenate of lead; dissolve and dilute each separately in a pint or two of water; mix them, and make up the quantity to 4 gallons. Apply this spray occasionally as required to the plants in the seed-bed, a special application being made a day or two before the plants are lifted for putting out in the field. As the insects referred to feed on the under side of the leaves, care must be taken to apply the spray to those parts. Once the plants are well established and the autumn rains commence the danger period is over, as the more humid atmosphere is detrimental to the pests and advantageous to the crops.

CELERY, ASPARAGUS, AND RHUBARB.

The increasing demand for celery makes it worth while to consider more wholesale methods of cultivation, such as are practised in America, where this crop is now grown in fields of considerable acreage, so great is the popular demand. The main crop is planted on the flat in rows 4 ft. or 5 ft. apart and 5 in. or 6 in. between the plants. The sticks are blanched by moulding them up with soil by means of an adjustable moulding-plough before the growth is completed. For summer crops the rows are closer, and 10 in. or 12 in. boards are placed along each side of the rows of plants for blanching them, or builder's paper is used. As strong leaf-growth of good texture is required of these plants, it is natural to find nitrogenous manures and potash the most suitable for growing the crop successfully.

Permanent beds of asparagus and rhubarb must now be allowed to recover from the hard treatment they have received by the cutting and pulling of the young growth throughout the spring months. A good dressing of fertilizers, and, if the weather is dry, a good soaking with water will greatly assist them. Where plantations of rhubarb have to be remade it is customary in some localities to do it at this season, lifting the plants, cutting the fleshy roots up into pieces with two good shoots in each, and replanting.

—W. C. Hyde, Horticulturist.

WEATHER RECORDS: OCTOBER, 1926.

Dominion Meteorological Office.

GENERAL SUMMARY.

THE weather of October was remarkably wet, both in the amount of precipitation and the number of days, except in the Poverty Bay and Hawke's Bay districts and in Westland. From the 1st to the 12th the weather was most unsettled, and rain was recorded every day in most parts of the Dominion, but heaviest in the North.

On the 10th and 11th an ex-tropical disturbance passed over the North Island, and snow and hail fell on higher levels in the North as well as in many places in the South Island. A wintry snap followed, and a sharp frost was experienced on the morning of the 13th. This did a considerable amount of damage to tender spring growth.

From the 9th to the 12th rainfall was remarkably heavy in the basin of the Waikato River, and the highest flood recorded for nineteen years continued for several days. There were magnetic storms about the middle of the month, associated with sun-spots. Many people tried to account for the preceding weather by reference to these phenomena, but there does not, so far, appear to be any scientific relationship useful to the Meteorologist.

An extensive westerly disturbance held sway during the last week of the month, but was complicated by a well-defined cyclonic system which invaded the larger area of low pressure. The centre of this storm passed through Cook Strait on the 28th. There were some heavy rainfalls, accompanied by thunderstorms, in the South Island at the close of the month; and Westport experienced a flood on account of heavy rain and melting snows at the source of the Buller River.

Sunshine was below the average for the month. Barometric pressure was everywhere below the mean for the month, and was only above the normal about the 23rd and 24th.

The returns so far show a difference in temperature—the North Island being somewhat warmer, and the South Island rather cooler, than usual at this time of the year.

RAINFALL FOR OCTOBER, 1926, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October. Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	9·04	16	2·16	4·48
Russell	8·69	15	2·01	3·27
Whangarei	10·50	18	1·74	4·58
Auckland	7·55	21	2·01	3·64
Hamilton	8·24	25	1·94	4·04
Kawhia	10·06	26	2·28	5·28
New Plymouth	12·13	23	2·03	5·48
Riversdale, Inglewood	21·08	26	3·52	10·37
Whangamomona	15·58	19	2·50	9·11
Tairua	7·24	9	2·20	6·89
Tauranga	8·86	24	2·12	5·25
Maraehako Station, Opotiki ..	7·72	15	1·58	5·50
Gisborne	2·20	13	0·80	2·80
Taupo	8·03	19	1·79	4·38
Napier	1·74	16	0·46	2·30
Maraekakaho Station, Hastings ..	1·97	15	0·56	3·09
Taihape	3·68	19	0·73	3·99
Masterton	5·27	17	1·26	3·32
Patea	9·60	23	1·33	4·11
Wanganui	7·36	19	1·88	3·65
Foxton	7·09	15	2·26	2·92
Wellington	6·72	20	2·03	4·15

RAINFALL FOR OCTOBER, 1926—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
South Island.				
	Inches.		Inches.	Inches.
Westport	7·10	27	1·62	6·97
Greymouth	7·30	23	1·37	10·66
Hokitika	10·33	24	1·39	11·84
Ross	9·61	19	1·42	15·16
Arthur's Pass	18·36	17	5·99	20·99
Okuru, Westland	14·86	22	3·14	15·37
Collingwood	16·68	22	2·81	11·03
Nelson	4·83	16	0·67	3·59
Spring Creek, Blenheim ..	4·38	13	0·95	2·39
Tophouse	6·66	22	1·25	5·80
Hanmer Springs	6·45	18	1·89	3·15
Highfield, Waiau	4·73	13	1·44	2·46
Gore Bay	4·68	14	1·34	1·80
Christchurch	2·84	16	1·09	1·68
Timaru	3·42	16	0·90	1·95
Lambrook Station, Fairlie ..	3·26	13	0·64	2·00
Benmore Station, Clearburn ..	3·20	16	0·93	2·09
Oamaru	3·83	19	1·61	1·68
Queenstown	3·97	15	1·42	3·60
Clyde	2·61	11	1·05	1·58
Dunedin	6·05	20	2·03	3·09
Wendon	3·65	12	1·51	2·50
Gore	3·51	16	1·28	3·37
Invercargill	4·34	17	1·12	4·44
Puysegur Point	5·82	18	1·58	8·16

—*D. C. Bates, Director.*

INVENTIONS OF AGRICULTURAL INTEREST.

APPLICATIONS for patents, published with abridged specifications in the *New Zealand Patent Office Journal* from 9th September to 4th November, 1926, include the following of direct agricultural interest :—

No. 54892 : Milking-machine teat-cup ; R. Caldwell, Whakamara. No. 55008 : Cow-cover ; H. B. Gibson, Frankton Junction. No. 55121 : Milking-machine vacuum tank ; O. Randrup, Hamilton. No. 55379 ; Milk straining, atomizing, and cooling apparatus ; National Dairy Association of New Zealand, Wellington. No. 56198 ; Plough-lift ; P. and D. Duncan, Ltd., Christchurch. No. 56809 : Flax-treatment ; S. H. Maddren, Christchurch. No. 55306 : Curd-mill driving-gear ; Union Foundries, Ltd., Stratford. No. 55410 : Plough-lift ; E. C. Gaisford, Bull's, and A. H. Dales, Marton. No. 55188 : Belly-band ; W. J. Mitchell, Hindon. No. 56500 : Rabbit-trap ; J. M. de Soric, Randwick, N.S.W. No. 56541 : Cheese-reconstituting ; J. R. Butland, Auckland. No. 56956 : Sheep-shearing-machine driving-mechanism ; A. G. Hutchinson and C. S. McCabe, Wellington. No. 57123 : Sheep-shears ; Chicago Flexible Shaft Co., Chicago, U.S.A. No. 57168 : Harrow ; H. S. Pearson, Springston.

Copy of full specifications and drawings in respect of any of the above may be obtained from the Registrar of Patents, Wellington. Price 1s.

Rabbit Districts.—By Order in Council gazetted on 7th October, Part III of the Rabbit Nuisance Act, 1908, is declared not to be in operation in the Mairoa Rabbit District, Auckland.

THE VETERINARY SURGEONS ACT.

THE full text of this measure—providing for the registration of veterinary surgeons—passed in the last session of Parliament, is as follows:—

1. This Act may be cited as the Veterinary Surgeons Act, 1926, and shall come into force on the first day of January, nineteen hundred and twenty-seven.

2. In this Act, unless the context otherwise requires, "Board" means the Veterinary Surgeons Board constituted under this Act; "Registrar" means the Registrar appointed under this Act.

3. (1.) For the purposes of this Act there shall be appointed a Board to be called the Veterinary Surgeons Board.

(2.) The Board shall consist of—(*a*) The Registrar, who shall be appointed by the Governor-General from among the veterinary surgeons in the employment of the Department of Agriculture; (*b*) one person to be appointed on the recommendation of the Minister of Agriculture; and (*c*) two veterinary surgeons to be appointed on the recommendation of the incorporated society known as the New Zealand Veterinary Association (Incorporated).

(3.) The members of the Board other than the Registrar, who shall hold office during pleasure, shall be appointed by the Governor-General for a period of three years, save that any such member may be reappointed, or may be at any time removed from office by the Governor-General for disability, insolvency, neglect of duty, or misconduct, or may at any time resign his office by writing addressed to the Registrar: Provided that, after the expiration of twelve months from the commencement of this Act, no person shall be appointed or shall continue to be a member of the Board as one of the veterinary surgeons appointed on the recommendation of the New Zealand Veterinary Association (Incorporated) unless he is registered under this Act.

(4.) If any member of the Board other than the Registrar dies, resigns, or otherwise vacates his office, the vacancy so created shall, within two months after the occurrence thereof, be filled in the manner in which the appointment to the vacant office was originally made. Every person so appointed shall hold office for the residue of the term for which his predecessor was appointed.

(5.) The members of the Board, other than the Registrar, shall be paid such allowances as may be lawfully appointed and all travelling-expenses reasonably incurred by them in respect of attendance at meetings of the Board.

(6.) In the absence of the Registrar from any meeting of the Board any officer of the Department of Agriculture may be appointed by the Registrar to act as his deputy, and while so acting shall for the purposes of this Act have all the powers of the Registrar.

4. (1.) The Registrar shall be the Chairman of the Board.

(2.) Meetings of the Board shall be held at such times and places as the Board or the Chairman may appoint.

(3.) The Board may regulate its procedure in such manner as it thinks fit.

5. The Registrar shall keep in his office a book, to be called the Register of Veterinary Surgeons, in which shall be entered the names of all persons registered as veterinary surgeons under this Act, together with such other particulars in relation thereto as may from time to time be prescribed.

6. (1.) Every person shall, on payment of the prescribed fee, be entitled to be registered as a veterinary surgeon under this Act who satisfies the Board that he is of good character and repute, and that—(*a*) He is a member of the Royal College of Veterinary Surgeons at London; or (*b*) he is a graduate in veterinary medicine and surgery, or the holder of a veterinary diploma, of any veterinary school or other institution (not being the Royal College of Veterinary Surgeons aforesaid) by the statutes or rules of which a course of not less than four years' study of the appropriate subjects is required before a veterinary degree or diploma, as the case may be, can be conferred, and which is recognized by the Government of the country in which it is established and by the Board as a proper and efficient teaching institution; or (*c*) not being qualified to be registered under either of the two last preceding paragraphs he was employed or was practising as a veterinary surgeon in New Zealand at the date of the commencement of this Act, and that

he is a graduate in veterinary medicine and surgery, or the holder of a veterinary diploma, of a veterinary school or other institution by the statutes or rules of which a course of three years' study of the appropriate subjects is required before a veterinary degree or diploma, as the case may be, can be conferred, and which is recognized by the Government of the country in which it is established and by the Board as an efficient teaching institution.

(2.) No person shall be registered as a veterinary surgeon under paragraph (*c*) of the last preceding subsection unless application for registration is made within one year after the commencement of this Act.

7. (1.) Every application for registration under this Act shall be in writing addressed to the Board, and all the facts set forth in the application shall be verified by statutory declaration of the applicant.

(2.) No entry in the register of the name of any person shall be made by the Registrar without the direction in writing of the Board.

8. Every person registered as a veterinary surgeon under this Act shall, on payment of the prescribed fee, be entitled to receive a certificate of registration under the hand of the Registrar.

9. Every person who makes any false or fraudulent representation, or produces to the Board or the Registrar any false certificate or testimonial, for the purpose of securing his registration under this Act commits an offence, and is liable to a fine of fifty pounds.

10. The Board may cause to be removed from the register the name of every registered veterinary surgeon who has been registered in error, or who is convicted of any offence punishable by imprisonment and dishonouring him in the public estimation, or who has been guilty of such improper conduct as renders him, in the opinion of the Board, unfit to be registered under this Act.

11. (1.) Every person whose application for registration has been declined by the Board, or whose name has been removed from the register, may, within three months after notice of such refusal or removal has been communicated to him by the Registrar, appeal in the prescribed manner to a Board of Appeal, consisting of a Magistrate and two assessors, appointed in accordance with regulations under this Act.

(2.) The Board of Appeal shall thereupon hear the appeal, and may either confirm the decision of the Board or order the registration of the appellant or the restoration of his name to the register, and the determination of the Board of Appeal shall be final and conclusive.

12. On or before the thirty-first day of March, nineteen hundred and twenty-eight, and in each year thereafter, every registered veterinary surgeon who desires to have his name published in the *Gazette* as such shall forward to the Registrar the prescribed fee for such publication, together with the name and address of the applicant and such other particulars as may be required by the Board.

13. (1.) The Registrar shall, in the month of April, nineteen hundred and twenty-eight, and thereafter in the month of April in every year, cause to be published in the *Gazette* a list of the names, with prescribed particulars, of such registered veterinary surgeons as have applied to have their names so published and have paid the prescribed fee.

(2.) The *Gazette* containing such list shall, unless the contrary is proved, be sufficient evidence in all judicial proceedings that on the thirty-first day of March immediately preceding the date of the *Gazette* every person whose name appears therein as a registered veterinary surgeon was duly registered as such, and also that every such person has continued to be so registered at all times after the said thirty-first day of March and before the date of the next publication in the *Gazette* of the list of registered persons.

14. (1.) Save as provided in the next succeeding subsection, every person commits an offence, and is liable to a fine of twenty pounds, who, not being a registered veterinary surgeon, takes, uses, or adopts the name, title, or description of veterinary surgeon, veterinarian, or veterinary practitioner, or uses or causes to be used in connection with his business, trade, calling, or profession any written words, titles, initials, or abbreviation of words, titles, or initials intended to cause, or which may reasonably cause, any person to believe that he is a registered veterinary surgeon.

(2.) Any person who has practised as a veterinary surgeon in New Zealand for not less than ten years immediately prior to the commencement of this Act

may, notwithstanding that he may not be qualified to be registered under this Act, continue in practice, and may use in connection with his business the designation of "veterinary practitioner," if he lodges his name with the Minister of Agriculture not later than twelve months after the commencement of this Act, and satisfies him that he has been practising as aforesaid, and that he is of good character and repute.

(3.) In every prosecution for an offence against this section the burden of proving that the defendant, at the time when the offence was committed, was registered under this Act shall lie upon the defendant.

15. All fees and other moneys paid under this Act shall be paid into the Public Account and shall form part of the Consolidated Fund, and all expenses incurred in respect of the administration of this Act shall be paid out of moneys to be from time to time appropriated by Parliament for the purpose.

16. The Governor-General may from time to time, by Order in Council, make regulations—(*a*) Prescribing forms of application for and certificates of registration under this Act; (*b*) prescribing the fees payable in respect of registration under this Act, and also prescribing fees for the issue of certificates of registration and for the annual publication in the *Gazette* of the name of any registered veterinary surgeon; (*c*) providing for the appointment of assessors and the conduct of appeals under section eleven hereof; (*d*) generally providing for such other matters as, in the opinion of the Governor-General in Council, are necessary or expedient for the effective administration of this Act.

BOVINE TUBERCULOSIS.

THE occurrence of this disease in New Zealand is referred to as follows in the annual report of the Live-stock Division for 1925–26:—

"The condemnations of cattle on clinical examination and as the result of the tuberculin test numbered 4,692, being a decrease on the previous year's figures of 189. The distribution of the stock condemned was as follows: Auckland, 2,852; Wellington (including Taranaki and Hawke's Bay), 1,308; Canterbury-West Coast, 367; Otago-Southland, 165. The use of the tuberculin test for diagnostic purposes was availed of to the number of 4,725 head of cattle. An analysis of the results of the examination of carcases on slaughter at freezing-works and abattoirs during the year discloses a decrease of 0·35 per cent. in the number of cattle found affected with tubercular disease. The number of cattle (excluding calves) examined was 364,572, of which 18,770, or 5·16 per cent., were found to be affected in varying degrees, a considerable number only very slightly. In the case of swine, a decrease of 0·50 per cent. is disclosed. The number of swine examined was 366,269, of which 31,420, or 8·57 per cent., were found to be affected in varying degrees, and, as in the case of cattle, a considerable number only slightly. These figures indicate that an improvement on the past year has taken place, which it is trusted will be maintained and improved on in the years to come. While this disease is responsible for considerable monetary loss to producers in this Dominion, it is nevertheless satisfactory to note that it is held in check by our system of inspection and condemnation of all the live animals showing symptoms of the disease, and also the free use of the tuberculin test for diagnostic purposes. As has been previously mentioned, bovine tuberculosis is most prevalent in low-lying wet or swampy areas, of which there are many in the Auckland Province, and until drainage and better conditions generally can be introduced to those areas the incidence of tuberculosis may be expected to continue."

Area under Potatoes.—The Government Statistician estimates the area under potatoes this season (1926–27) as 5,550 acres in the North Island and 18,950 acres in the South Island, or a total of 24,500 acres. The corresponding final figures for the 1925–26 season were 5,438, 18,046, and 23,484 acres respectively. Only holdings of 1 acre and over outside borough boundaries are covered by these figures. A fair aggregate area of potatoes is grown on the smaller holdings and within boroughs.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

BONE-CRUSHING ON THE FARM.

"FARM ECONOMIST," Waitekauri :—

Is there any known method by which bones can be profitably made into manure on the farm? Is it possible to buy a small mill capable of dealing with a few hundredweight, and, if so, at what price? Water-power in plenty is available.

The Fields Division :—

The first thing to do in the process of reducing bones to a condition suitable for application to the soil is to degrease them. This can be done in a somewhat crude way by boiling in an open vessel. It is advisable to acidulate the water in which the bones are boiled by the addition of a small quantity of sulphuric acid—say, ¾ per cent. of the weight of bones taken. The bones thus treated should, when dried, be crushed. Bone-crushers can be procured at prices varying up to about £5. A No. 1 Bentall's crusher will do 3 to 5 bushels per hour. It is a hand machine, and the cost is £3 15s. It will reduce the bones to the fineness of flour. The No. 4 Kornking will do 10 to 15 bushels per hour; 1½ horse-power is necessary to run this machine, and the cost is £5.

CALF-FEEDING.

W. BELL, WOODSIDE :—

I am rearing four calves, and have till now been feeding them with 6 pints of whole milk per head twice daily. They are now receiving a similar quantity of skim-milk with one dessertspoonful of pure olive-oil added. Can you tell me if this is an effective substitute for the whole milk, and, if not, what quantity of oil would be required?

The Live-stock Division :—

It is advisable to supplement skim-milk by adding an allowance of linseed. This can be done by soaking whole linseed overnight in water and boiling it for twenty minutes in the morning to the consistency of a porridge. Give each calf a tablespoonful daily, gradually increasing the allowance to two and three spoonfuls. As this porridge is liable to sour, sufficient to last only two days in summer and three days in winter should be made at one time. It is also necessary in rearing calves to provide clean, fresh pasture.

WORMS IN HORSES.

"SUBSCRIBER," Otane :—

Kindly advise me of a good cure for worms (of a small red species) in horses; also causes and prevention of same.

The Live-stock Division :—

Worm infestation in horses is caused by their taking in the eggs or larvæ with their food. These come to maturity within the body of the animal, but do not actually cause much trouble unless its condition has been pulled down from other causes. Treatment along the following lines should prove effective in remedying the trouble: Give a bran mash instead of the usual feed in the evening, followed by a drench next morning consisting of turpentine, 1 oz., in linseed-oil, 1 pint. Food should be withheld altogether for the day, and the next morning a physic ball consisting of 6 to 8 drachms of aloes (according to the size of the horse) should be given. A good nourishing diet, light at first, should be now given, as it is essential to build up the strength of the horse so that it may combat further infestation.

GUMMING OF CHERRY-TREES.

"GARDENER," Scargill :—

I have some cherry-trees which have a kind of blight. Gum oozes from them in places, and the parts affected afterwards die off. Could you tell me of a cure ?

The Horticulture Division :—

The gumming of cherry-trees is often caused by any one of a number of fungous diseases attacking the tree, or by some physical injury or abrasion. Treatment in such cases consists of suitable spraying after pruning away the diseased growths, or trimming the wounds and applying a suitable dressing. In other cases, however, gumming takes place without any of these exciting causes. The trouble is then known as gummosis, and is a physical disease the cause of which is unknown, but generally considered to be due to wet, rich soil, unsuitable stocks, or varieties unsuitable to the locality. In very bad cases the trees should be dug out and discarded. In other cases the worst wounds may be trimmed and dressed with tar or paint, and a good dressing of lime applied to the soil. Very often, also, vertical incisions are made on the bark with considerable benefit.

BLACKBERRY-SEED AND BIRDS.

G. W., Rawene :—

Please tell me whether blackberry-seed when eaten by pheasants is digested or passed in the excreta in a condition to germinate.

The Live-stock Division :—

The fruit of the blackberry-plant gives sustenance to bird-life mainly by reason of its fleshy integuments, and although some of the actual seed itself may become dissolved and assimilated in the process of digestion there is little doubt that quantities of it are passed in the excreta in such a condition as to allow of germination. In nature bird-life plays a large and valuable part in the dissemination of vegetable growths, and to the native birds of this country is due in no small measure the credit of clothing in pristine luxuriance its broad spaces with the magnificent milling-timbers now, unfortunately, so sadly depleted.

LEAF-MOULD FROM PINE-NEEDLES.

R. F. G., Blenheim :—

Please inform me the value of leaf-mould made from the "needles" of *Pinus insignis*. Could it be used for the same purposes as leaf-mould made from the leaves of deciduous trees ?

The Horticulture Division :—

Leaf-mould from pine-needles has often been used as an ingredient of potting-soils, but our experience is that it has not proved satisfactory.

MAKING PIT ENSILAGE.

"SILAGE," Manaia :—

I am considering making silage in a pit this season, and would like to know if 6 acres of lucerne and oats would be sufficient material. It is not much of a crop at present, the lucerne being ten months old. I thought, if the lucerne and oats were not enough, to cut a portion of a hay paddock. The pit is 13 ft. by 18 ft., and 12 ft. deep. If I removed the earth about February, could I put another cut of lucerne on without doing any harm ?

The Fields Division :—

Six acres of lucerne and hay should just about fill your pit, but should the crop be light and the pit not full it would be good practice to cut a portion of an oat crop or other surplus grass to fill the pit. The earth could be removed

from the pit in February, and a second cut of lucerne put on. If you decide to do this and have any old sacks available, cover the material in the pit with these before applying soil. When you remove the soil there is sure to be some material on the top that has spoilt. This should be thrown out before the fresh material is put on.

REVIEW.

"WEEDS OF NEW ZEALAND."

A NUMBER of excellent books have been written from time to time in England, America, Australia, &c., dealing with the identification of weeds and their control, and on comparing these it will be found that a large majority of the plants are of European origin, and that a surprising number are common to most temperate countries, including New Zealand. Not long ago many inquiries made by farmers in this country about weeds would have been answered with the statement that such-and-such an English text-book existed which would make it easy to identify any weeds likely to be met with here, and would give full instructions how to control them.

It is now beginning to be realized, however, that though certain of the weeds of two countries may be known to be the same from the systematic botanist's point of view, the mere identification of a weed with a European one, for instance, is only the first step in obtaining an insight into the best control methods to be used against it in a country entirely different in climate, &c. There are no rule-of-thumb methods that can be applied equally well to a weed wherever it exists, and it is to the agricultural workers of each country that we must look for knowledge of the weeds of their land as regards their relative harmfulness and the best means of controlling them.

Much has been written from time to time on the weeds of this country from the New Zealand farmer's point of view, but "Weeds of New Zealand, and how to eradicate them," by F. W. Hilgendorf, M.A., D.Sc., F.N.Z.Inst. (Whitcombe and Tombs, Limited; 6s. 6d.), may be said to be the first real attempt to gather together all this information between the two covers of a book.

The author is generous in his acknowledgments, and makes no claims for his work as the outcome of original research. It is not revolutionary in its nature —no new principles in the art of weed-control are involved—and, considering the great changes that are being made from year to year over the face of the country, it is likely enough that many of the statements made by the author will need revision before long. But the very workers that bring this about will, if they are fair-minded, be the first to acknowledge their indebtedness to the book. However, such a work as this is primarily addressed to the man now on the land, and he will undoubtedly find that it answers clearly many of the questions that confront him.

The main body of the book comprises a series of descriptions of the important weeds of the Dominion, each being supplemented by notes showing how it may best be controlled. There are two chapters that are likely to prove of use in the identification of weeds to those who know nothing of the classification of plants by families. In one of these (Chapter IX) the weeds are arranged in groups according to the colours of their flowers, and though, as the author says, there is a considerable degree of indefiniteness about such an arrangement, it should prove useful in conjunction with the next chapter, where there is a tabular grouping of weeds (under their common names, as in the preceding chapter), their relative abundance in eighteen different districts being recorded.

Many of the most important weeds are illustrated, while there are also a number of enlarged photographs of weed-seeds. It is a matter of some regret in regard to the latter that the degrees of magnification of different kinds of seeds shown on the same page should not have been specified, as often quite a wrong impression is given of their relative sizes, even though a note of explanation is printed on pages where this occurs.

E. H. A.

Noxious-weeds Order.—The Whangaroa County Council has declared cut-leaved psorolea and Cape honey-flower to be noxious weeds, under the Act, in that county.

THE SEASON'S LAMBING: NORTH ISLAND ESTIMATE.

FROM information furnished by Inspectors of Stock in the various districts the average lambing for the current season in the North Island is estimated at 84·35 per cent. With 7,503,200 breeding-ewes in the North Island, as shown in the 1926 sheep returns, the number of lambs is estimated at 6,329,338. South Island and Dominion estimates will appear in next month's issue of the *Journal*.

ESTIMATED AREAS UNDER WHEAT AND OATS.

THE following estimates of the areas under wheat and oats in the Dominion for the current season have been issued by the Government Statistician at date 26th October, the figures being based on the usual card census: Wheat—North Island, 3,500 acres; South Island, 218,500 acres: total, 222,000 acres. Oats—North Island, 35,000 acres; South Island, 370,000 acres: total, 405,000 acres. The corresponding final totals for the preceding season (1925–26) were 153,248 acres of wheat and 367,205 acres of oats. Wheat, therefore, has an estimated increase in area this season of 68,752 acres, and oats an increase of 37,795 acres. The areas under the different main varieties of wheat grown are specified as follows: Tuscan or Longberry, 151,728 acres; Hunter's (various), 28,373 acres; Velvet or Pearl, 13,402 acres.

FORTHCOMING AGRICULTURAL SHOWS.

Thames Valley A., P., and H. Association: Te Aroha, 23rd and 24th November.
Winton A. and P. Association: Winton, 24th November.
Otago A. and P. Society: Dunedin, 24th and 25th November.
Egmont A. and P. Association: Hawera, 24th and 25th November.
Whangarei A. and P. Society: Whangarei, 24th and 25th November.
Stratford A. and P. Association: Stratford, 1st and 2nd December.
Wyndham A. and P. Society: Wyndham, 10th December.
Horowhenua A. and P. Association: Levin, 25th and 26th January, 1927.
Rangitikei A. and P. Association: Taihape, 26th and 27th January.
Helensville A. and P. Association: Helensville, 29th January.
Golden Bay A. and P. Association: Motupipi, 1st February.
Feilding A. and P. Association: Feilding, 1st and 2nd February.
Woodville A. and P. Association: Woodville, 4th and 5th February.
Omaha and Pakiri A. and H. Association: Leigh, 5th February.
Kawakawa A. and P. Association: Kawakawa, 5th February.
Te Puke A. and P. Association: Te Puke, 9th February.
Dannevirke A. and P. Association: Dannevirke, 9th, 10th, and 11th February.
Pahiatua A. and P. Association: Pahiatua, 12th February.
Rodney Agricultural Society: Warkworth, 12th February.
Masterton A. and P. Association; Solway, 15th and 16th February.
Whakatane A. and P. Association: Whakatane, 16th February.
Te Awamutu A., P., and H. Association: Te Awamutu, 16th February.
Buller A. and P. Association: Westport, 18th and 19th February.
Marton A. and P. Association: Marton, 23rd February.
Franklin A. and P. Association: Pukekohe, 25th and 26th February.
Waikato Central Agricultural Association: Cambridge, 2nd and 3rd March.
Mongonui County A. and P. Association: Kaitaia, 5th March.
Morrinsville A., P., and H. Society: Morrinsville, 9th March.
Amuri A. and P Association: Waiau, 9th March.
Taranaki Metropolitan Agricultural Society: New Plymouth, 9th March.
Mayfield A. and P. Association: Mayfield, 19th March.
Temuka A. and P. Association: Geraldine, 7th April.
Mackenzie County A. and P. Society: Fairlie, 18th April.

Association secretaries are invited to supply dates and location of their shows for publication in this list.